Biological & Medical Serials
P
AGRIC
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Vol. XXXII. Part 9.

THE AGRICULTURAL GAZETTE OF NEW SOUTH WALES

STORAGE
Closed with this No.
see letter
Forestry
dated
23 Apr
192

SEPTEMBER
1921

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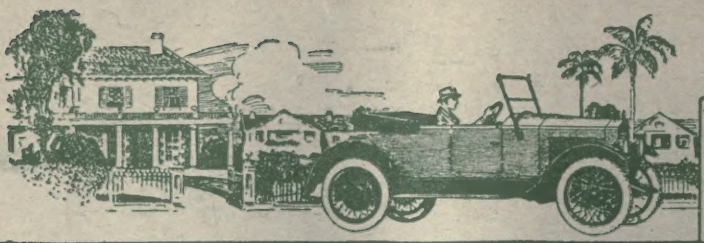
Price SIXPENCE.



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AN OWNER WRITES:—

HERE is the experience of an ESSEX owner who uses two of these cars for Service work, carrying overloads of passengers and luggage on country roads of rough surface and severe gradients.

"In regard to my two ESSEX Cars I cannot say anything against them they are the best cars I have had, both in petrol consumption and tyre upkeep. The big car has been tested a good many times with seven and eight on to Walcha and back, and every time has done 25 miles to the gallon. The small car did a long trip the other day to Tyringham, on the rivers, and back; road bad, and hardly fit for a motor to travel in places; drove it myself, and I averaged 22½ miles to the gallon."

"TYRES! I very seldom take one off under 7,000 miles, and have had some to go over 10,000 miles. One of my original tyres I have in my shed did 13,000 miles; that is a fact. My old car has done now 22,300 miles. I can prove to you any of these words that I have said."

J. MONCKTON, Armidale."

DALGETY & COMPANY LIMITED
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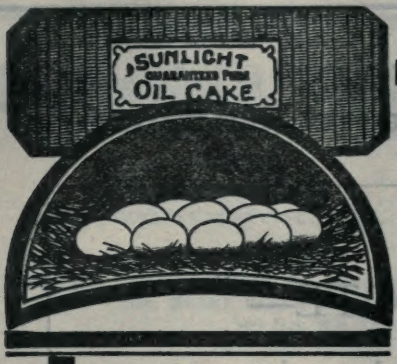

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The general cause of shortage in eggs is either too high feeding or too low. For laying hens, Sunlight Oil Cake will quickly give a return which will astonish the owner. For chickens at any time after the age of 6 weeks it is unequalled.

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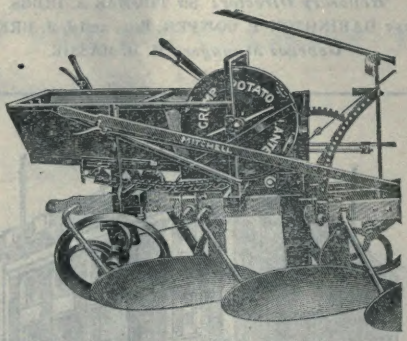

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As an investment for the farmer and potato grower, we know of nothing that can be bought to equal **Crump's Potato Planter**—at its price. This wonderful time and labour-saving machine, which can be fitted to almost any plough, is **light in weight**, most **simple in operation.** Further than this, it is a **most efficient** machine, and will pay for itself over and over again. If you want **bigger and better crops** and **greater profits**, by all means invest in **Crump's Potato Planter**—obtainable from Mitchell's. Let us send you full particulars, prices, terms. Attach name and address to this announcement, and post to our Dept. **A.**

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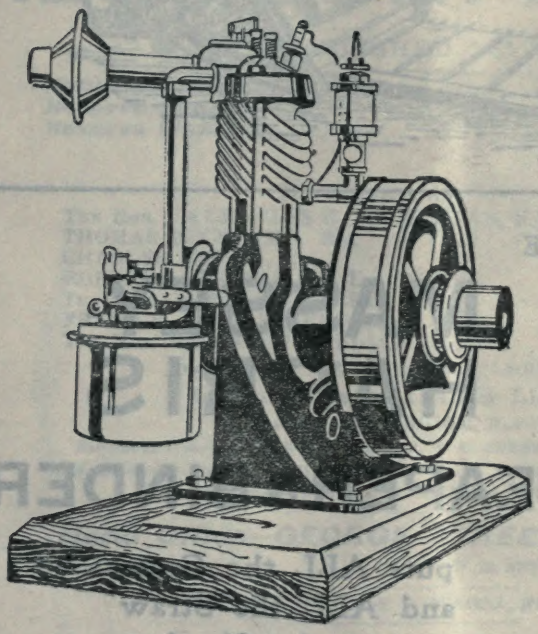
"Standard" Separator Engine



This strong and simple Engine will drive a cream separator, churn, corn-sheller, grindstone, pump, drill press, turning lathe or any other kind of machinery where ½ horse-power is required.

It will run steadily for 4 hours on a ¼ gallon of benzine.

The "Standard" is built of the very best materials and guaranteed against defects in construction or mechanism. It is perfectly balanced, ensuring absolutely quiet and even running.

Price of Engine

£32

Intermediate gears or worm drive pulleys complete for any Separator, from £5 upwards according to make of Separator.

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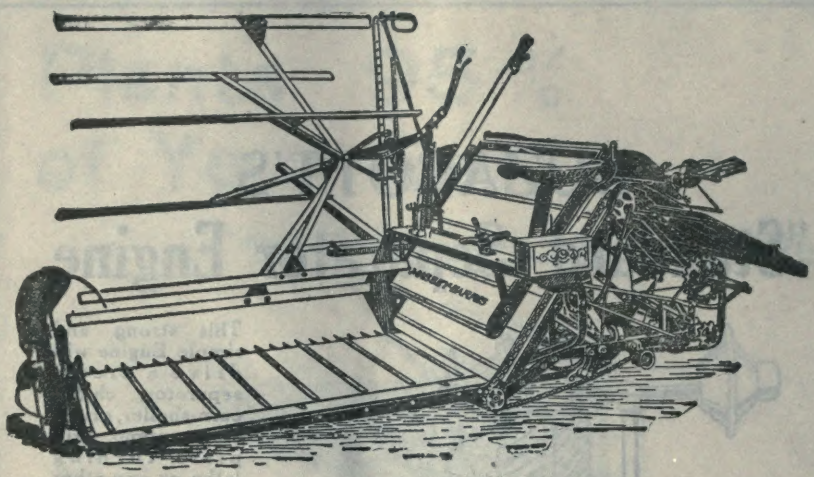
7-11 MARKET STREET, SYDNEY.

And at Brisbane.



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MASSEY-HARRIS

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puts ALL the Grain
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The MASSEY-HARRIS Sheaf is neat, compact and firmly tied.

Sample Machines may be inspected
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THE smaller your flock—the more important the above question.

Nearly 15% more wool can be secured from every sheep with a Shearing Machine than with blade shears. Over 90% of Australia's large Shearing Sheds are fitted to-day with Machine Shears.

The Stewart No. 9 Ball Bearing Shearing Machine

extends the same advantages to the owner of a small flock that the owner of large flocks secures with his big shed plant. This machine is known in every country where wool is grown. Not only is it profitable for shearing small flocks, but it is invaluable for crutching on the station.

The gears are all enclosed and run in oil. All points subjected to much friction are fitted with ball bearings.

Strong—Simple—Easy to Operate.

Can be set up in a few minutes.

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GET A STEWART MACHINE TO-DAY AND ENSURE A BETTER WOOL CLIP AND A BIG SAVING IN BOTH TIME AND MONEY.

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Their knowledge and advice is at your disposal. We invite inquiries and will gladly help you solve your orcharding or vine-growing problems. Correct spraying is essential to good results. Among our specials in this section may be quoted—

Bordeaux Paste and Powder for Downy Mildew.

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All of these mixtures are available in any quantity. Prices and particulars on request.

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Specialists in Orchardists and Vignerons' Supplies,
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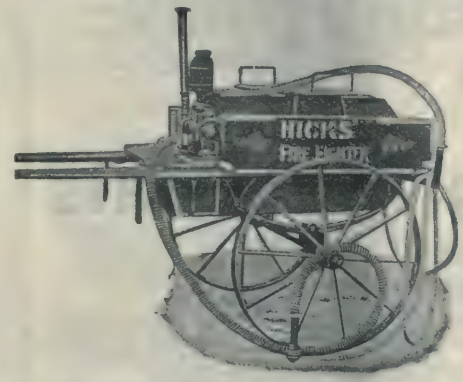
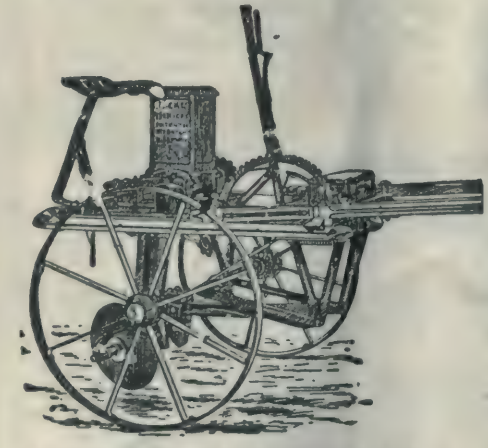


have time and again proved themselves invaluable in time of drought and fire.

Only last summer thousands of pounds worth of property, grass lands, etc., were saved by

Hicks' Fire Fighters

The WATER CARTS render great service in carrying water to stock, or teams out working in the fields. They are reliably constructed and give the best of service. Don't be caught without one.



Hicks' "Ideal" Poison Carts

are unequalled for distributing baits to destroy rabbits effectively. The "Ideal" has won numerous field trials, and will do all the work claimed of it. They are strongly constructed, simple to work, and are right up-to-date. When destroying rabbits be economical and use **"IDEAL POISON."**

"ACME" EAR MARKING PLYERS supplied by us have been used with satisfaction for years. They make clean cuts and have the keenest of edges, which do more ears without getting dull than any other make of plyers.

T. H. HICKS, Ltd.,

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Why a "COMET" gives 25 per cent. more water

YOU can't get Rolls Royce results if you buy a Ford—neither can you obtain ——— "COMET" results from any other sort of windmill.

The features which produce "COMET" superiority are strength, ball-bearing turntable, set of the sails, large bearings, proper lubrication, and the important fact that the "COMET" stops in such a position that it commences pumping again before other mills have started.

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There are five "COMET" Windmills on Coolullah, and I am expecting to have three more this year. I would like especially to refer to their high pumping capacity, the low cost of repairs, and general freedom from trouble.

(Signed) G. H. CREAGHE, Manager.

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must prove its title by the merit of its service, by the efficiency of its methods, by the results which it obtains.

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A skilled staff of specialists is at your service to handle your consignments and utilise all the power of scientific salesmanship to achieve maximum results. Do not fail to take advantage of this progressive sales organisation. Your interests are identical with ours—let us co-operate for mutual benefit.

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BITUMINOUS FELT FLAT ROOFING

ESPECIALLY MANUFACTURED FOR OUR CLIMATE.

IN ROLLS. 72 feet x 3 feet (216 Square Feet).
INCLUDING TACKS AND CEMENT.

	1 Ply:	2 Ply:	3 Ply:	
Prices:	**35/-**	**45/-**	**55/-**	**per roll.**

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DOES NOT IN ANY WAY AFFECT THE WATER.

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STEEL BLACKSMITH'S BLOWER

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EVERY WISH THAT USERS CAN DEMAND.

THE
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"CHAMPION"
STEEL
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BALL-BEARING, ensuring perfect ease in running. As good after 14 years' use as when new.

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in rolls 72 ft. x 3 ft.

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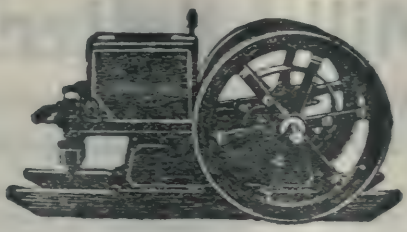

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Shown here are two engines that have our special recommendation because of their easy starting, perfect performance, and thorough dependability.

Above is pictured

Buzacott's (F & J) Stationary Kerosene Engine

which is giving splendid service to men on the land all over Australia. It is very simple and compact, economical to run, and develops full rated power.

On the right is shown

Buzacott's (F & J) Farm Pump Engine

A steady worker that can be applied to wood-cutting, driving the milking or separating machines, or any other kind of light farm machinery—while it does the pumping.

Full investigation of these engines will repay you. Details will be promptly forwarded on request.

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More Milk! Better Beef!

KARSWOOD COW DRINKS insure healthy herds and maximum production

THE man who keeps cattle, either for profit or for pleasure, owns the best animals that he can afford. But the maximum results are forthcoming only when his herd remains in sound health.

In the wild state an animal is able to choose by instinct the herbs and grasses which afford it a perfectly-balanced diet. However well fed and well cared for, the animal under domestication will lack something, and at times it will ail. Immediately its usefulness is impaired.

But science steps in and places in the hands of the stock-owner an excellent remedy for sick cattle. KARSWOOD COW DRINKS are the quickest, safest, and most certain specific for ailing cattle.

Read this wonderful testimony :

"Nine out of every ten cured by Karswood Cow Drinks"

Anglesey, Wales.

"I have cured nine out of every ten sick cattle with the Karswood Cow Drinks for over 32 years. They are the best cow drinks made, and all farmers about here that have used them would say the same.

I use them as a purge, and in nine out of every ten cases of sickness with cattle it is purging that will cure them, the quantity according to age and size I never gave more than three-quarters of the packet at first. It works in about nine hours. I have often given about half a packet on the second day to a full-size cow.

I could not describe all the cases where I have used it—they are too numerous. I sell a lot of it to farmers about here, and they all, like myself, think there is nothing equal to and as cheap as the Karswood Cow Drink. I am sure once it is used no farmer would be without it, unless he knows he can have it from a neighbour, as is the case in this district.

I give it to all ages, including calves. Of all the excellent things you make, you have nothing to beat your Karswood Cow Drinks. You can make any use you like of this letter."

THOMAS DAVIES.

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Coastal Farmers' Co-op. Society Ltd.

QUAY STREET, SYDNEY.

Price, 1/6 per tin. If your own dealer cannot supply, send a postcard to the Australian Importing Agents for your State (address above) asking the name of the nearest dealer who supplies KARSWOOD COW DRINKS.

DON'T FIDDLE WHILE ROME BURNS.

Or in other words, don't look on while the rabbits make a permanent home on your property.

ARM YOURSELF WITH A

"SUDDETH"

Fumigator and Smoker

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Kill Whole Colonies at One Go.

THE "SUDDETH" used all over Australia, generates smoke without fire—Kills quick in the largest burrows—Requires charging only once a day. Is effective in any country.

Mr. A. STEWART,
"Charleyong," Braidwood.

I treated 150 acres with the first drum of Carbon Bisulphide (parts fairly rough and rocky), and very few rabbits are showing there since. I can safely say I killed 80 or 90 per cent. and outside rabbits are the only ones left.

Mr. GEO. SULLIVAN,
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I have just finished fumigating a 200-acre paddock and although I have only been over it once, there is scarcely a rabbit to be found. The "Suddeth" is particularly suitable for rough country.

PRICES:
F.O.B. SYDNEY.
Securely Packed.

	£	s.	d.
No. 2 Suddeth Fumigator & Smoker	7	0	0
Patent Smoke Mixture (per box)		15	6
Carbon Bisulphide (which I import direct) per 5 gal. drum - -	2	18	0

Prices are Subject to Alteration Without Notice.

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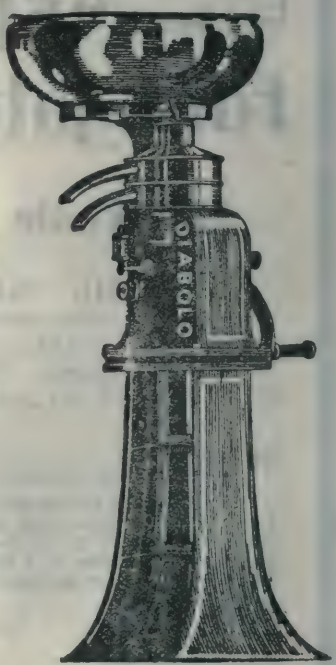
F. S. GREER, ***Patentee & Manufacturer, 102 Sussex-st., Sydney.***

Best thing on the Dairy Farm

BECAUSE the Diabolo prevents any waste of cream—and money—it is the best thing you can have in your dairy.



Every vital feature for close skimming, smooth running, and quick, easy cleaning, is built into the Diabolo by the world's largest separator factory, and the enormous production explains the low price.

There's lifelong service in every Diabolo because of the strong construction and high quality of materials used. One cow, or one hundred, there is a Diabolo for your needs. Write now for prices and particulars.

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Corner MARKET and KENT STS., SYDNEY

DIABOLO SEPARATOR

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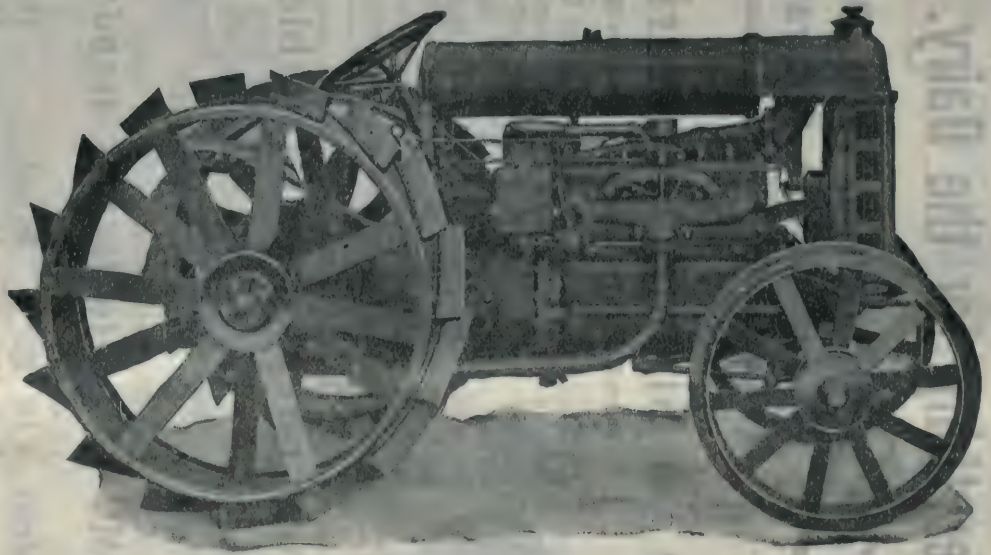
Fordson Tractor.

WHEN you are short of labour and your boy or girl is eager to help ——



That's when a farmer needs a FORDSON.

Write to-day for particulars

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Everything for the Dairy.

DOMO **Household, Farm, Dairy, and Power Separators.**

HAS STOOD 18 YEARS TEST.

A Simple Neckbearing.

Undue Strain on Gearing Causes Premature Wear.

ONE of the special advantages of the DOMO is its neckbearing. Its construction guards against costly renewals and delays whilst undergoing repair. It is made of three plain steel bands. Spiral springs, cord packing or any device which requires adjusting is entirely eliminated. Has stood 18 years without alteration. Its design has never been altered because

It has never given trouble.

OTHER GOOD FEATURES ARE — Splash Lubrication, Patent Ball-bearing, Bottom Screw, Seamless Tinware, Patent Bowl Coupling, Standard Swedish Bowl.

The DOMO skims to factory standards.

	£	s.	d.		£	s.	d.
9 gall. (discless)	6	10	0	35 gall. - -	16	10	0
12 ,, ,, -	8	5	0	45 ,, - -	21	0	0
18 ,, - -	10	10	0	65 ,, - -	30	0	0
22 ,, - -	12	10	0	105 ,, - -	41	0	0
30 ,, - -	14	10	0	135 ,, - -	47	0	0

Agents in every important town.
Travellers visit North and South Coast dairying districts regularly.
All particulars from—

The DOMO SEPARATOR COMPANY

THIRD FLOOR :: 70 WENTWORTH AVENUE, SYDNEY.

350 lbs. STRONGER THAN No. 8 GAL.

BUFFALO OVAL-STEEL

HEAVILY GALVANISED GOVERNMENT TEST.

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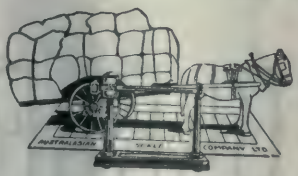

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3	—18 „	... 10 0 0	„	8 0 0	... 2 0 0
4	—22 „	... 11 0 0	„	8 16 0	... 2 4 0
5	—30 „	... 13 0 0	„	10 8 0	... 2 12 0
6	—33 „	... 15 0 0	„	12 0 0	... 3 0 0
6c	—33 „	... 15 10 0	„	12 8 0	... 3 2 0
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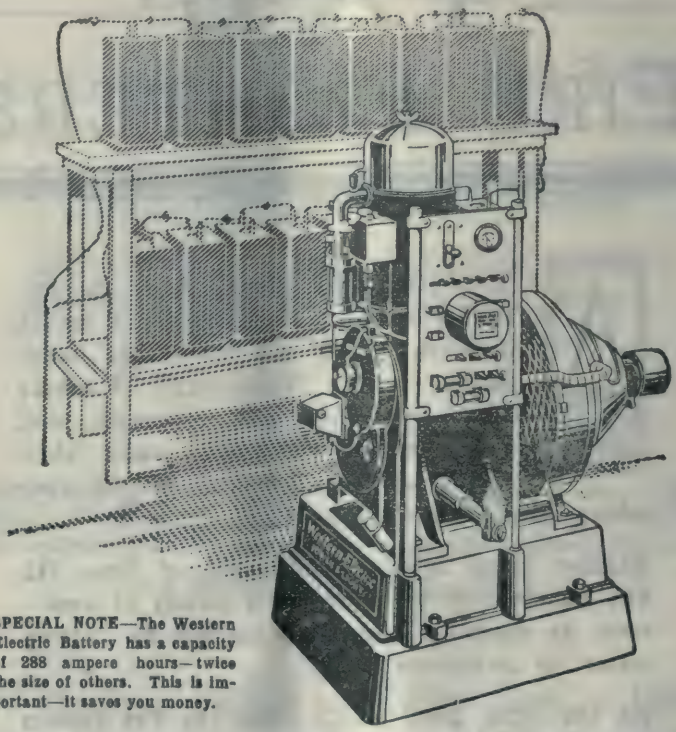

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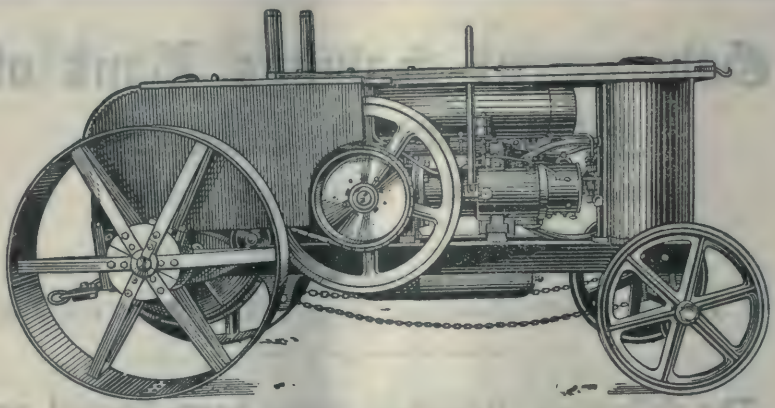

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Vol. XXXII. Part 9. *SEPTEMBER 2, 1921.*

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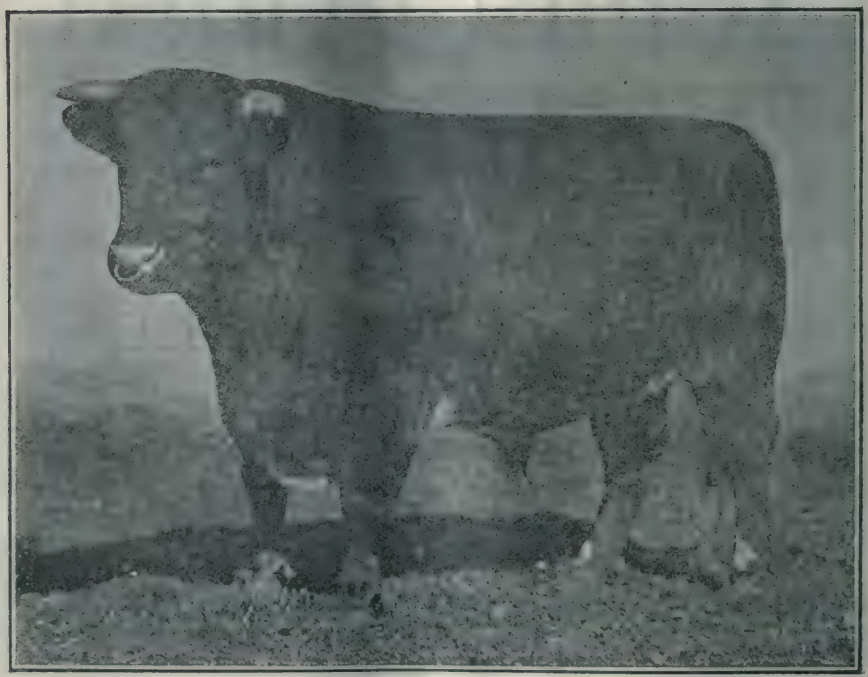

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2nd September, 1921.

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Retford Park Jerseys

Owned by SIR SAMUEL HORDERN.

"PROMETHEUS" Imp.) Colour—Practically Whole.

Calved—February 6th, 1917. Sire—"MALVOLIO" 11417. Dam—"PROMISE" Vol. XX, p. 408.

"PROMISE"—Dam of "Prometheus" averaged 8967 lbs. of milk for 7 years, and won the following prizes in Butter Tests:—2 First Prizes, 2 Gold Medals, 1 Second Prize, 1 Silver Medal, 1 Fourth Prize, and 5 Certificates of Merit. In Milk Prizes she won 1 First Prize, 2 Second H.C., R.N., H.C., H.C. at various Shows, 1909 to 1913.

"POST ORBIT"—Grand Dam of "Prometheus" won in Butter Tests 4 First Prizes, 3 Gold Medals, 4 Second Prizes, and 2 Silver Medals, 3 Third Prizes and 2 Bronze Medals. In Milk Trials she won 4 First Prizes, 4 Second Prizes, R.H.C., H.C., at various Shows, 1906 to 1914. She yielded 93,994 lb. Milk in 9 years; average, 10,656 lb. per year. She also won 22 Prizes in classes, including 6 Firsts and 2 Blythwood Bowls. **His Sire's Dam** "Mrs. Viola" won E.J.C. Certificate of Merit in Butter Tests 1905, 1906, 1909, 1911; her average yield of Milk was 9,098 lb. per year for six years; she also won 6 Firsts and 1 Champion Prize, 1906 to 1911. **Sire's G. Dam** "Marigold XV" won in Butter Tests 3 Gold Medals and 3 First Prizes in Milking Trials, 1906 to 1910; her average milk was 9,448 lb per year for 12 years.

Full Particulars from—

The Manager, Retford Park, Bowral, N.S.W.

VOL. XXXII. PART 9. SEPTEMBER 2, 1921.

Agricultural Gazette of New South Wales.

601

Farmers' Experiment Plots.

POTATO EXPERIMENTS, 1920–21.

Upper North Coast District.

W. D. KERLE, Inspector of Agriculture.

EXPERIMENTS were conducted with potatoes in the season 1920–21 in co-operation with the following farmers :—

Henry Short, " Warrawee," Dorrigo.
F. Allard, " Glenrose," Brooklana, Eastern Dorrigo.
F. Johnson (Mrs.), Condong, Tweed River.
A. Cortes, Mullumbimby, Brunswick River.
G. Long, " Glengarry," Tatham, Richmond River.
A. Eggins, " Bromley," Grafton, Clarence River.
E. N. Mackinnon, Lawrence, Clarence River.
T. J. Jarrett, " Edgefern," Nana Glen, Orara River.
M. J. Reedy, Warrell Creek, Nambucca River.

The plots at Brooklana were ruined by flood rains in January; germination and growth to the flowering period had been excellent.

The Season.

The season was, for the most part, favourable. Winter rains were abundant and although August was dry, ample rains fell during the growing period. Unfortunately Irish blight (*Phytophthora infestans*) made its appearance in the plots at Dorrigo and Tatham, and considerably reduced the yields. It would appear from this and previous outbreaks that the conditions conducive to the development of the disease are excessive humidity, midsummer temperatures below normal, and an excessive rainfall. Considerable damage to the foliage of the plots at Condong, Grafton, Lawrence, Tatham and Warrell Creek was done by the ladybird beetle (*Epilachna 28-punctata*), which is often mistaken for the pumpkin beetle, though quite different in colour, shape, size and markings. This ladybird belongs to the only group of the genus *Epilachna* which is leaf-eating in both grub and adult stages, all others being particularly valuable in destroying aphis, scale, &c.

The rainfall for the chief months of growth was as follows :—

Month.	Dorrigo.	Nana Glen.	Grafton.	Lawrence.	Mullumbimby.	Condong.	Tatham.	Warrell Creek.
1921.	Points.	Points.	Points.	Points.	Points.	Points.	Points.	Points.
August ...	..	.	...	...	...	36 (fm 18th)	..	...
September ...	...	246	320	314	381	448	311	...
October ...	648	676	581	592	450	434	524	308
November ...	1,051	413	311	291	420	424	819	476
December ...	234	124 (to 16th)	...	...	...	...	330	350
January ...	900 (to 13th)	..	...	...	...	...	.	246
Total ...	2,833	1,459	1,212	1,197	1,251	1,342	1,984	2,380

Details of the Plots.

Dorrigo.—Soil (red, volcanic, free-working, typical of best soil of plateau: site of experiment, new ground: only previous crop a light one of late maize. Ploughed the end September and harrowed. Plots drilled in 7th to 9th October, in rows 2 ft. 6 in. apart, sets 12 inches to 15 inches apart in rows; pressed firmly into loose soil with the foot and covered with plough. Soil moist and in good condition at planting. All plots germinated excellently, and the weather conditions being particularly favourable, the growth of haulms was rapid and luxuriant. The crop was hilled on 22nd November, and when seen on 3rd December presented a particularly clean and healthy appearance, the early varieties being in flower and the tops meeting between the rows. The tubers set well and gave every promise of exceptional yields, until, following on a week of particularly wet and cool weather, early in January, 9 inches of rain fell. Irish blight made its appearance, and the tops were reduced to a black mass of diseased foliage in less than a week. Harvesting was not done until June, by which time the diseased tubers were rotted away and the crop was clean and apparently disease-free. It is estimated that fully two-thirds of the crop was lost by disease. This is the second outbreak of blight in this locality in the last ten years. The varieties most affected by the disease were Manhattan, Plunkett, Coronation, Carman No. 1, and Surprise. The comparative resistance of the varieties is reflected in the yields. In the case of Satisfaction and Early Manistee, which head the list, their yield is more likely due in this instance to their earlier maturity than to actual powers of resistance. In the previous two years' trials under normal conditions, Satisfaction has yielded badly, occupying fourteenth and thirteenth places respectively, and Early Manistee little better, being thirteenth and seventh. Langworthy, on the other hand, has shown a remarkable consistency, being second, first, and third in the last three seasons, with an average yield of 10 tons 5 cwt. 2 qrs. per acre. For the same period the most consistent varieties have been Factor, 9 tons 16 cwt. 1 qr., Up to Date, 9 tons 10 cwt. 2 qrs., Carman No. 1, 9 tons 6 cwt. 1 qr., and Coronation, 9 tons 4 cwt. 2 qrs. Small plots were planted at this centre to increase the quantity of seed for trial next season of the following new varieties:—Tasma (*Commersoni Italiani*), Arran Chief, Dalhousie, Scottish Triumph, Trafalgar, Carman No. 1, and Cooke's Favourite.

The manurial trial, sown with Langworthy, showed a remarkably increased yield with a comparatively heavy application of superphosphate. In previous trials 3 cwt. was the heaviest dressing, but an additional 2 cwt. this season gave an increase of 1 ton 6 cwt. 3 qrs. 14 lb., equal to 2 tons 2 cwt. 1 qr. over unmanured. The latter increase is remarkable as the trial was conducted on new ground. Despite the prevalence of blight in this crop, Mr Short secured first prize for varieties at the Royal Agricultural Show, Sydney, and at the local shows at Dorrigo, Bellingen, Grafton, Ulmarra and Maclean. The potatoes exhibited in the North Coast district and Department of Agriculture's exhibits at the Royal Show were mainly secured from these plots.

Results of Potato Variety Trials.

——	Dorrigo.	Nana Glen.	Grafton.	Lawrence.	Mullumbimby.	Condong.	Tatham.	Warrell Creek.
Date sown.	8th and 9th Oct.	1st Sept.	7th Aug.	10th Aug.	23rd Aug.	18th Aug.	25th Aug.	22nd Sept.
Fertilised with ...	Superphosphate, 3 cwt.	P7, 3 cwt.	Superphosphate, 3 cwt.	P6, 3 cwt.	P6, 3 cwt.	Superphosphate, 3 cwt.	Superphosphate, 3 cwt.	Superphosphate, 3 cwt.
Effective rainfall	28·33 in.	14·59 in.	12·12 in.	11·97 in.	12·51 in.	13·42 in.	19·84 in.	23·80 in.
	t. c. q. lb.	t. c. q. lb.	t. c. q. lb.	t. c. q. lb.	t. c. q. lb.	t. c. q. lb.	t. c. q. lb.	t. c. q. lb.
Satisfaction ...	6 1 0 0	7 13 0 24	2 18 2 0	3 17 0 0	3 10 1 0	3 18 0 0	2 0 0 0	4 19 2 6
Early Manistee ...	5 12 1 10	7 1 1 20	3 19 2 0	3 13 0 0	Failed.	4 12 3 0	2 4 3 0	3 11 3 0
Langworthy ...	5 11 3 14	.....	.....	.....	.....	.....	.....	.....
Adirondack ...	5 11 0 0	.....	.....	.....	.....	.....	.....	.....
Up-to-date ...	5 10 1 24	7 15 1 12	3 13 3 0	5 14 1 0	7 10 0 0	3 5 3 0	3 11 2 0	5 18 0 20
Factor	5 10 0 0	8 7 0 16	5 6 3 18	3 6 3 0	8 19 0 0	4 10 1 0	3 1 0 0	5 7 0 16
Carman No. 1 ...	5 4 2 8	8 1 3 4	2 13 1 0	3 10 1 0	4 16 1 0	3 15 2 0	4 7 0 0	4 9 1 4
Brownell's Beauty	5 2 1 0	.....	5 5 1 0	5 18 0 0	8 12 0 0	4 16 2 0	2 2 3 0	5 6 1 0
Manhattan ...	4 16 0 0	8 11 1 20	7 5 3 9	4 8 0 0	6 2 3 0	5 8 3 0	3 10 0 0	5 18 1 6
Coronation ...	4 15 1 20	.....	.....	.....	.....	.....	.....	.....
Surprise	4 15 0 0	6 13 3 20	.....	.....	.....	.....	.....	.....
Queen of Valley ...	4 11 2 18	.....	.....	.....	.....	.....	.....	.....
Early Rose ...	4 7 1 10	.....	.....	.....	6 19 0 0	.....	.....	.....
Blue Manhattan ...	3 12 2 12	.....	.....	.....	.....	.....	.....	.....
Improved Brownell's Beauty ...	3 5 1 18	7 0 0 0	.....	.....	.....	.....	.....	.....
Plunkett ...	3 0 3 24	.....	.....	.....	.....	.....	.....	.....

Results of Potato Manurial Trials.

——	Nana Glen.	Lawrence.	Dorrigo.	Warrell Creek.	Tatham.	Condong.	Grafton.
Date sown.	31st Aug.	11th Aug.	7th Oct.	21st Sept.	24th Aug.	17th Aug.	8th Aug.
Variety employed	Up-to-date.	Up-to- ate.	Langworthy.	Manhattan.	Manhattan.	Brownell's Beauty.	Manhattan.
	t. c. q. lb.	t. c. q. lb.	t. c. q. lb.	t. c. q. lb.	t. c. q. lb.	t. c. q. lb.	t. c. q. lb.
Superphosphate 5 cwt. per acre.	8 9 1 4	8 17 0 0	6 18 1 0	6 9 1 24	3 11 1 0	3 18 0 0	6 18 2 11
P5 ... ... 2½ ,, ,,	8 3 3 20	8 8 3 12	5 1 1 0	4 18 0 24	3 0 0 0	3 16 0 0	6 17 3 4
P8 ... ... 3 ,, ,,	8 3 1 16	7 5 2 10	5 16 0 0	4 19 2 6	2 7 2 0	5 2 2 0	7 5 0 6
P7 ... ... 3 ,, ,,	7 15 1 12	.....	5 3 3 0	3 11 3 14	3 3 3 0	.....	7 19 2 7
Superphosphate 3 cwt. ,,	6 19 1 4	7 14 0 0	5 11 1 14	5 18 1 6	2 9 2 0	3 16 2 0	7 5 3 9
Basic super.. 2 ,, ,,	6 10 2 22	6 19 2 0	4 11 1 0	5 0 1 22	3 5 0 0	4 7 1 0	7 10 1 7
No manure	2 6 0 8	6 17 3 0	4 16 0 0	2 4 0 18	2 5 0 0	3 15 2 0	6 19 1 20
P6 ... ... 3 cwt. per acre	.....	6 15 3 9	.....	.....	.....	4 14 0 0	.....
Superphosphate 2 ,, ,,	.....	.....	.....	5 16 0 8	.....	.....	7 13 2 5
Greatest increase due to fertiliser	6 3 0 24	1 19 1 0	2 2 1 0	4 5 1 6	1 6 1 0	1 7 0 0	1 0 0 15
Cost of applying highest yielding fertiliser per acre ...	£ s. d. 2 15 0	£ s. d. 2 5 0	£ s. d. 2 15 0	£ s. d. 2 6 3	£ s. d. 2 3 0	£ s. d. 2 0 0	£ s. d. 1 18 0
Nett increased return at £5 per ton	28 1 0	7 11 3	7 16 3	19 0 0	4 8 3	4 15 0	3 2 0

The mixture P5 consists of superphosphate 4 parts, sulphate of potash 1 part; P6 of bonedust 3 parts, superphosphate 1 part, muriate of potash 1 part; P7 of equal parts of superphosphate and bonedust; P8 of equal parts of superphosphate and blood and bone.

Nana Glen.—Soil, light alluvial loam; site, bank of Orara River; practically new ground; ploughed first in summer 1917, cropped to oats in the autumn and maize in the spring, followed by oats early in autumn of 1920. The potatoes were sown on 31st August and 1st September, in rows 2 ft. 9 in. apart; seed obtained from Dorrigo. After-cultivation of plots consisted of harrowing on 8th September, scuffling on 5th October, hilling 20th October. Season exceedingly favourable, and the growth of top luxuriant. Harvesting eventuated on 21st and 22nd December; the yields were exceptionally good and high for the locality. The percentage of unmarketable tubers was very light in these trials, Up-to-date being highest at 6 per cent., Early Manistee 5 per cent., and all others less than 2½ per cent. That the high yields in the variety trial were largely due to the application of P7 fertiliser at 3 cwt. to the acre is evidenced in the trial with fertilisers. This was made with Up-to-date, two plots without manure being planted for purposes of comparison. Right from the start the unmanured plots were exceedingly backward, and only averaged at harvest 2 tons 6 cwt. 0 qrs. 8 lb. to the acre of marketable tubers, 23½ per cent. being unmarketable. An application of 5 cwt. superphosphate gave an increase over this yield of 6 tons 3 cwt. 0 qrs. 24 lb., only 2½ per cent. being undersized. All manures gave substantial increases, the lowest being basic superphosphate at 2 cwt., which yielded 6 tons 10 cwt. 2 qrs. 22 lb., 9 per cent. being unmarketable.

It is abundantly evident that fertilisers are very necessary on similar sorts in this locality, and that heavy applications are desirable. The addition of organic matter by green manuring and ploughing in of all rubbish is also recommended.

Grafton.—Alluvial loam, typical of Clarence River; previous crop, maize. Ground ploughed twice, tubers ploughed in 2 ft. 6 in. apart and 15 inches in the rows. Soil moist and in good tilth, rolled after planting and harrowed twice before and once just after coming through the ground. Planted on 7th and 8th August; variety trial fertilised with 3 cwt. superphosphate and Manhattan employed in the manurial trial. Germination satisfactory and subsequent growth excellent. The season was one of the best for years, for although August was rainless, winter rains had been heavy and the soil was in a moist condition. The plots were harvested first week in December, Manhattan proving the highest yielding of the seven varieties tested. Second place was occupied by Factor, but nearly 2 tons to the acre lighter. The manurial trial showed an increase of a ton over unmanured, with 3 cwt. of P7, which also gave the highest return in last season's experiments. The behaviour of plots fertilised with superphosphate is rather remarkable in this experiment. It would appear that the heavier the dressing the lighter the yield—an application of 5 cwt. to the acre actually resulting in slightly less than no manure. This has not been the case in previous trials, and subsequent experiments may show it to be a result of climatic, rather than of soil conditions.

Lawrence.—Experiments in this locality were sown in different paddocks: manurial trial was on new ground first broken up 15th January, 1920, cross-ploughed 5th March, and rolled and harrowed several times after each ploughing; sown with maize for fodder 9th March; soiled during May; ploughed 7th July; reploughed 9th August, and planted on 11th. The variety trial was sown in an old cultivation paddock; previous crop, maize; ploughed 6th April, reploughed 5th August, harrowed several times after each ploughing and sown 10th August. Soil in both cases, sandy loam, drills 2 ft. 7 in. apart. After cultivation harrowed 28th August; scuffled 15th and 27th September, and hilled 28th September. The season was excellent, 11·97 inches of rain falling up to 11th November. Any further rain was too late to benefit the crop.

The difference between the yield of the manurial and variety trials is mainly due to the former being on new ground. Manhattan, which is largely grown by farmers in the locality, was inferior to Brownell's Beauty and Up-to-date. In the fertiliser trials an increase of nearly 2 tons resulted from the application of 5 cwt. superphosphate, which gave the highest yield for the locality.

Mullumbimby.—Soil, red volcanic; previous crop, oats unmanured; preparation good, soil in fair tilth; planted 23rd August in rows 2 ft. 9 in. apart. Experiment consisted of trial of nine varieties. Germination of all good, except Satisfaction, Early Manistee and Dalhousie which came up badly, particularly the two latter, the yields of which were not taken; growth of top luxuriant; tubers of Up-to-date and Satisfaction were small. Season satisfactory, 12·51 inches of rain being exceptionally evenly distributed over the growing period.

It would appear from the result of this first season's trial that Factor and Brownell's Beauty are the most suitable varieties for the locality.

Condong.—Soil, alluvial, typical of Tweed River; previous crop, maize; ploughed 1st July; reploughed 10th August; harrowed and rolled after last ploughing; sown 17th and 18th August, in drills 2 ft. 9 in. apart; sets 15 inches apart. Germination satisfactory. The season was very good, the effective rainfall being 13·42 inches. The after-cultivation of the crop consisted of: harrowed, 17th September; scuffled, 24th September; hilled 2nd October. Harvesting took place on 13th and 14th December. The manurial trial, sown with Brownell's Beauty, demonstrated the value of fertilisers, all showing increased yields, the highest being 1 ton 7 cwt. with P8, which consists of equal parts of superphosphate and bone and blood, and which does not usually give such good results with potatoes. The only previous experiments in this locality were planted in the 1917–18 season, and were unfortunately ruined by flood waters in November, 1917. No data is available other than this season's experiments, and the result of future trials is necessary before definite recommendations can be made.

Tatham.—Soil, heavy alluvial, typical of best soils of Richmond River; previous crop, maize; stalks chopped and ploughed in May; second ploughing

in July, and third just before planting; rolled and harrowed after each ploughing; ground moist, but rough; rolled and harrowed immediately after planting, scuffled twice, and hilled during growth. Sown 24th and 25th August. Germination satisfactory in all but Early Manistee, Brownell's Beauty and Satisfaction, in which it was uneven. The weather for the first two months was ideal, but November, with a precipitation of 8·19 inches, favoured the development of Irish blight, which reduced the yields very considerably. It would appear from the variety trial that Carman No. 1 was most resistant to the disease. This variety in last season's trials generally showed hardiness under extreme drought conditions, and is apparently one that can withstand hardships. Manhattan did not yield well, the highest return being 3 tons 11 cwt. 1 qr., when manured with 5 cwt. of superphosphate to the acre.

Warrell Creek.—Soil, light alluvial; previous crop, maize; ploughed in with disc on 4th June; left rough; fallowed and ploughed on 9th August, harrowed and disc cultivated 21st September; harrowed and planted on 22nd idem. Drills, 5 inches deep, 2 ft. 9 in. apart, sets 15 inches apart. Covered with Planet Jr. implement, with side sweeps attached. Soil in excellent tilth. Season very fair, rain in January excessive. The variety trial, fertilised throughout with superphosphate 3 cwt. per acre, favoured Manhattan and Up-to-date, with only a slight difference in favour of the former. The manurial trial distinctly favoured the application of chemical fertilisers, all showing a decided improvement over the unfertilised plot This difference was apparent in the growth of haulm right from the start. On 29th October the manured portion was 12 inches high, showed a healthy green colour and thick sturdy stems, the two unmanured plots at that time being 3 inches high and of sickly appearance. Such a difference was not anticipated here as in the plots at Nana Glen, and demonstrates the extreme variations that exist even in alluvial soils.

Size of Set Experiment.

An experiment to determine the most satisfactory size of "set," was sown with Brownell's Beauty, at Condong, adjoining the fertiliser trial. Tubers were graded as follows:—"Small," about 2 oz. in weight; "medium," 5 oz.; "large," 8 oz., from which as many sets as possible were cut.

The results obtained were as follows:—

	t.	c.	q.	lb.
1. 1 oz. sets from "large" tubers	5	3	1	0
2. 1 ,, "small" ,, ...	5	0	2	0
3. 1½ ,, "large" ,, ...	4	17	2	0
4. 1½ ,, "medium" ,, ...	4	16	2	0

These yields do not vary considerably, but favour the large tuber cut into small sets. For this plot, tubers with strong and numerous eyes were employed, each cutting seven or eight sets. It would not be possible to cut

large tubers of some varieties, *e.g.*, Manhattan, and Early Manistee, in this manner, but if the waste is not great large tubers are preferable. These results, however, must not be regarded as in any way final, being for one season only.

Summary.

The results of the variety experiments this season are consistent with those obtained in previous trials, except where Irish blight was prevalent. In the majority of the centres, trials have been in progress for long enough to narrow down the most suitable varieties to two or three. In future trials these will be adopted as standards, and only new varieties will be tested in comparison. With regard to the manurial trials, the results show a remarkable consistency, with superphosphate at 5 cwt. to the acre out-yielding all others in five out of seven centres. In previous trials 3 cwt. of superphosphate was the heaviest quantity applied, but it would appear that the heavier application produces higher yields, at least in seasons when the rainfall is ample.

The chief virtue of superphosphate is its ready availability—putting within reach of the young plant soluble plant-food, and ensuring a healthy start. Although all fertilisers in these trials have given increased yields, it must be borne in mind that they will not make up deficiencies in the physical condition of the soil and thorough preparation is the first essential of profitable potato growing.

Growers must depend largely on field experiments, such as the foregoing, for accurate and specific information of comparative methods of potato growing. Particularly is this true of the necessity for applying artificial fertilisers, which cannot definitely be ascertained in any other manner. Artificial fertilisers are costly, and farmers cannot afford to apply to the soil materials which are not likely to produce a return. The experiments, while illustrating the value of fertilisers, also show what particular kinds can be economically used by the crop.

Treatment of Empty "Super" Bags to Arrest Decomposition.

Bags of any description are well worth caring for nowadays, and those that have contained superphosphate may be conserved for many other useful purposes if they are treated as follows:—Turn the empty bags inside out and thoroughly shake out all remaining superphosphate dust. Keep the bags away from wet or damp, and as early as convenient immerse them in lime-water until thoroughly soaked; then drain and hang them out to dry. Wherever a bag has actually been burnt by the action of the superphosphate the effect cannot, of course, be cured, but the action is effectually stopped by the treatment described.

The limewater should be made in the same way as that used for liming wheat after pickling with bluestone, about 3 or 4 pounds of freshly slaked quicklime being used to each 10 gallons of water. The larger quantity of lime is the better, as mice will not readily attack bags so treated.

The Size of Seed in Relation to Wheat Yields.

J. T. PRIDHAM, Plant Breeder.

An experiment to test the relation of the size of the seed to the yield in wheat was started by Dr. N. A. Cobb at Wagga Experiment Farm in 1898, when two rows of each variety were sown, the seed in one case being the largest and in the other the smallest in samples of the respective varieties grown the previous year. In 1899 the largest grains were picked from the row sown from the largest seed, and the smallest grains were taken from the produce of the row sown from the smallest seed. From year to year this practice was kept up, the grain for sowing being picked by hand from the respective lots harvested.

The results seem to show that the use of small seed does not result in any deterioration to speak of in respect to the quality and vigour of the grain but that the yields per acre are invariably low. While this may be made a strong case for grading, it should be pointed out that the smallest seed was used in the third section—grain that the harvesting machinery would remove as cracked and small chick wheat. In the light of other experiments with heavy and light or large and small seed it would appear that large and medium sized *sound* seed are about equally good for sowing. The great benefit of grading is to remove a large percentage of damaged and cracked grain, as well as small seed which might be left in the sample by ordinary harvesting machinery, together with foreign seeds and particularly oats.

Note.—The yields in 1899, 1900, and 901 were destroyed by grain moth.

Size of Seed in relation to wheat yields.

Year.	Largest grain from "Large Grain" row.					Largest grain from "Small Grain" row.					Smallest grain from "Small Grain" row.				
	Allora Spring.	Hudson's Early Purple Straw.	White Velvet.	Total.		Allora Spring.	Hudson's Early Purple Straw.	White Velvet.	Total.		Allora Spring.	Hudson's Early Purple Straw.	White Velvet.	Total.	
	oz.	oz.	oz.	lb.	oz.	oz.	oz.	oz.	lb.	oz.	oz.	oz.	oz.	lb.	oz.
1902	17¼	15¼	19	3	4	16⅜	16⅜	15	3	0½	6	6	6	1	2
1903	29	25	34	5	8	29	30	32½	5	11½	18½	21	13½	3	5
1904	32	30½	28½	5	11	31½	34	30½	6	0	15½	18	18	3	3½
1905	29	28	37⅜	5	14⅜	23	30⅜	35	5	8⅜	15¾	19⅜	21⅓	3	9
1906	33	21½	25	4	15½	35½	29½	31¼	6	0½	18⅜	13	18¼	3	2
1907	14	24	15⅜	3	5⅜	19½	20¼	16⅜	3	8½	9	11½	9⅜	1	14½
1908	35½	32⅜	33	6	5¼	33⅞	30⅜	35¼	6	4	22	18⅜	17¼	3	10
1909	22¼	32	32½	5	7	28¼	32⅜	30⅜	5	11¾	11	14⅜	8	2	1⅜
1910	78	61½	55¼	12	2¼	79	69	58½	12	14½	25¼	27½	16	4	4⅜
1911	18¾	23¾	24½	4	3	20¾	20½	23⅜	4	1	5½	7⅜	10½	1	7½

Producing Lucerne Hay under Irrigation Conditions.

Methods and Experiences at Yanco Experiment Farm.

[Concluded from page 564]

F. G. CHOMLEY, Manager, and F. CHAFFEY, Farm Foreman.

A Few Remarks on Grazing Lucerne.

A good deal of damage has been done to lucerne stands on the irrigation area by settlers who have grazed live stock after the hay crop is off, thinking that thereby the wisps of hay that have been left on the ground are saved. As a matter of fact, the quantity of hay so made use of is very small indeed, whereas the damage done to the stand is very considerable. Unskilful grazing will kill a stand in astonishingly quick time. Successful grazing is a business in itself, and the farmer who proposes to go in for it should do so systematically, subdividing his stand into half a dozen small plots, each of which could be grazed off by a suitable number of stock in turn, so that each block will have time to recover before it comes under stock again. In this way a careful grazer could do well with lucerne, and still preserve his stand. On the other hand, casual grazing of the whole area after each hay crop is likely to be attended with losses that far exceed all gains, for the stock in cleaning up the bit of hay left on the ground are certain also to graze the tender shoots of the next growth, and thus to delay the following cut as well as probably damage the plants.

It is important, for the sake of the stock, that animals be put on to lucerne full—not hungry—or hoven may occur, and with it serious losses among the stock. Some prevent too eager and greedy consumption by putting a bit in the mouth, and others turn the animals in for fifteen minutes and then ruthlessly turn them out before they can overfeed.

Pressing and Baling without Stacking.

From the field the hay is drawn to the yard, and unloaded straight from the waggon into a mechanical press that turns it out a properly squared, pressed, and wired bale. The implements and methods employed on the farm have already saved the cocking in the field, but here in the yard is a further important saving—the avoidance of all stacking whether in the open or in a shed. No stacking, no cutting out with the hay knife, no baling with wooden battens, and no laborious wiring, no delay for weeks in the stack before the crop can be turned into money.

Two waggons are used in carting on, so that while one is alongside the press the other is being loaded in the field, and thus a fairly continuous supply of hay is kept up to the press. The waggons used are ordinary iron-wheeled, 6-inch tired farm waggons of 5 or 6 tons burden, equipped with a

flat hay frame and a light batten frame set vertically in front, with a low sloping frame at the tail. This tail frame has the corners cut off to enable the hay loader to work in close while turning. The waggons are provided with one pair of shafts and two outriggers, one on either side; three horses are used abreast while loading, as a steady slow forward movement is essential. The load is pulled over on to the track leading to the press by the three horses; from there one horse pulls it, the other two horses remaining in the field for attachment to the next supply waggon to come out.

The hay is actually baled and prepared for market at a slightly greater cost than if it were stacked under the old method, and operations of cutting and baling from the stack, necessary under the old system at a cost of 12s. to 15s. per ton, are entirely saved.

The Derrick Hay Press at Work.

The hay is pressed and baled direct from the waggon.

Moreover, the old method was attended by a delay of weeks between carting in and marketing, whereas the machinery now in operation on the farm enables the hay to be marketed at once if the ruling price is attractive, or will permit it to be held in bales until the market is favourable, when it can be forwarded at once, all that is necessary being to cart it to the station. Even if the hay is only to be stored and fed to the farm stock when feed is scarce, it is an appreciable advantage to have the fodder in a convenient form in which it can be fed into the troughs and carted to the paddocks without any forking, and at no greater cost than a slight increase on the old method of stacking.

Some saving is represented, too, in the fact that if the hay has to be kept on hand it takes up only one-third of the space in bales that it would require in a shed or stack, it can be easily and quickly stacked and comparatively cheaply protected from the weather, and it will keep indefinitely.

The mechanical press that enables all this to be accomplished is illustrated in the accompanying blocks.

It consists of a derrick press, operated by any suitable power such as horse, steam, electricity, or combustion engine. From the dray or waggon the hay is forked to a platform where a second man directs it towards the press, which automatically feeds itself, drawing the material forward and folding it into layers in which it is moved forward into the press proper. There it is wired by two men, one of whom also carries the bales away. No. 14 soft black wire is used for the purpose, two wires being placed round each bale; the outlay on wire is almost trivial, for one coil presses about 12 tons, according to the quality of the hay. The finished bales are stacked by a fifth man when necessary. The bales, averaging about 90 lb. each, come away with mechanical regularity, and where once it required two men to be thoroughly expert to bale 3 tons per day, it is now possible with four or five men with no particular training to press and bale 14 tons per

Lucerne Hay ready for the Road.

day. The present plant owes some of its speed, of course, to the use of motor power (an oil engine), but with horse-power 8 tons per day have been pressed on the farm.

One stands beside this press with the reflection that yesterday this lucerne was a standing crop; to-morrow it will be on its way to Sydney.

When the new bales without the familiar wooden battens and the usual trimly-cut sides appeared on the Sussex-street market, they were viewed with some hesitation by buyers, but the prejudice gradually diminished and on occasions the derrick-pressed hay has actually topped the market. Some objection was offered at first, on the ground that the leaf was lost in hay pressed in this way, but that was when the hay was being pressed from the stack. Now that the hay is pressed direct from the field, and the operation of stacking is cut out the loss of leaf is far smaller, and the quality of the hay is correspondingly better.

To harvest, cure, bale, and truck seven cuts of hay per season from 120 acres looks a formidable matter, but it is accomplished by eight men in average working hours, and without any great pressure at any stage. Were it stacked in the ordinary way the same staff would be required, and to press and bale the crop as a subsequent operation would require further labour.

The last cut of the season being off (usually in May), all well-established stands of lucerne are cultivated with a thirteen-tooth cultivator. Six horses are required to operate the implement, which is always worked in the direction of the drill and the fall of the land. The tines are set firm, and when they strike a row of lucerne, instead of running along on the tops and injuring the plants, the implement moves laterally and the tines again run between the rows.

Following this, either in the early winter or in the spring the whole lucerne paddock is top-dressed with 2 cwt. superphosphate. Experiments are being conducted on the farm to determine the exact quantities that should be used, and the exact time (winter or spring). In the meantime the quantity mentioned can be recommended, and on the whole the early spring appears to be most effective.

At the same time, the convenience of the farm may be considered to the extent of making the application in the winter.

The final operation consists of a cross-harrowing, the object of which is to break up the clods and to level the ground again for the mower. The maintenance of the check banks must always be kept in view, of course.

Well established and well treated, a stand of lucerne in this district should last six or seven years at least. At the present time there is one paddock on this farm that is carrying 7-year-old lucerne, and it is as good as when it was 3 years old.

Yields.

It is only natural to expect that the yield per acre will depend upon the nature of the soil. As already stated, the soil on the experiment farm varies considerably, and while some patches grow luxuriantly (as shown in the illustrations) some are on the light side. The seven cuts taken in the season 1919-20 yielded an average of 6 tons 12 cwt. of baled hay per acre over the whole 120 acres in cultivation, which is slightly less than 1 ton per cut per acre. Owing to cooler weather and delays due to wet weather in the spring, the yield for the season 1920-21 was a little less. It would be safe, however, to count upon 5 tons of hay per acre per annum under normal conditions with average care.

A Prolific Sow.

Mr. S. W. Gardner, Springs Delight, Comboyne, writes:—"I have a Tamworth-Berkshire sow which in eight litters, has yielded me 123 pigs."

The Cause of Black Disease and its Method of Transmission.

Being Further Studies in a Braxy-like Disease of Sheep.

[Concluded from page 574.]

SYDNEY DODD, D.V.Sc., F.R.C.V.S., Lecturer in Veterinary Pathology and Bacteriology, Veterinary School, The University of Sydney.

Immunisation.

After the determination of the causal agent it was a natural sequence to endeavour to devise a method of prevention against black disease. Curative treatment, in view of the acuteness of the disease and the conditions under which sheep are kept in Australia, is impracticable. One aspect of prevention has already been dealt with, viz., the rendering of the moist areas unsuitable breeding-grounds for the intermediate host of the fluke (the water snail) by drainage. If this is not practicable such areas could be fenced off. The question of preventive vaccination has been considered, and an attenuated vaccine prepared. It was first tried on small animals, then on sheep, at the laboratory. About sixty of the latter, in batches of three or four, were vaccinated at various periods, and apparently the immunisation was efficacious, as the animals subsequently resisted fatal amounts of virulent bacilli. No reaction to the latter appeared at times, and a moderate local tumifaction developed at others, if a large dose (for example, 3-5 c.cs. of virulent culture) were injected. There were no deaths.

This success determined me to try the value of preventive vaccination in the field. During the seasons 1918-19 and 1919-20 between 5,000 and 6,000 sheep were vaccinated (about 2,600 each season), at such a period as would permit the immunity to be fully established before the onset of black disease. The animals were placed in two notoriously infected paddocks where the annual loss for years had been from 20 to 30 per cent., and several hundred unvaccinated sheep of the same age, sex, &c., were placed with them as controls. The results have been not altogether expected. If the vaccination were unsuccessful one would expect both vaccinated and control sheep to die in the same proportion, whereas if it were successful, only the control sheep should die in any number. As a matter of fact, during both seasons the mortality in these paddocks from all causes was not more than 2·5 per cent., and there was the same low percentage of deaths in the controls as in the vaccinated animals. As remarked, this tremendous reduction of the average mortality from black disease was not expected to be seen in the unprotected as well as the protected animals, and although the owner (who informed me that he had known the particular station for twenty-six years and in one of the experimental paddocks the mortality averaged 25 to 30 per cent. each season), was satisfied so far as losses were concerned, it did not solve the question as to whether the

vaccine was efficacious in the prevention of black disease. I think the real explanation of the great drop in the incidence of the disease in the particular paddocks is that the owner during the summer preceding the vaccination, had thoroughly drained the swampy places, so that the water from the springs could readily get away, and consequently the carriers of the disease had disappeared to a great extent.

Experimental vaccination can be carried out in the laboratory at any time of the year, but the real test of the value of such work lies in its application in the field on a large scale, and, owing to the seasonal character of black disease, this can only be carried out once a year, because no matter when the immunisation was made, one would have to wait until the end of the black disease season before any conclusions could be drawn as to its efficacy. If it were unsuccessful for any reason, then one would have to wait another year before undertaking a fresh series of field experiments on a large scale. It follows that such work cannot be accomplished quickly.

The research work in general has been prolonged for a variety of reasons; the strictly seasonal character of the disease (February to May being the usual period), the distance from Sydney (more than 300 miles to the locality of the disease), and the writer being engaged in teaching duties as well as carrying out bacteriological and pathological work for the State at the same time. Perhaps what has handicapped one most of all is the total absence of skilled technical assistance, all work, whether in the laboratory or the field, having in this respect to be carried out unaided. Those who have had to do with the preparation of culture media, cultures, sections, &c., will appreciate what this means. Finally, in view of the pitfalls which other workers have fallen into, it was very desirable that one should take more than usual precautions in order not to make the same or other errors.

The identity or non-identity of Black Disease with the Braxy-like disease of Sheep in Victoria and Tasmania, and Braxy or Bradsot.

It has not yet been established that the above diseases are identical. Several statements in the affirmative have been made, but these are merely opinions, and a definite decision as to whether the diseases are the same or not can only be arrived at by a comparison of the causal organisms, when the latter have been conclusively proved to be the etiological factor of each condition. In the meantime, however, one may express an opinion as to the probabilities, based on one's own experience and on the published work of others.

The evidence for the identity of black disease and the braxy-like disease in Tasmania and Victoria is very strong, save that the organism claimed by Gilruth to be the causal factor of the latter, is not the same as that responsible for black disease. On referring to his account of his investigations* one finds the following remarks *re* the disease in Victoria (page 570): "The soil is not rich . . . it is fairly watered by means of springs . . . which generally result in the formation of a small swampy area

* Proceedings of the Australasian Association for the Advancement of Science, 1911, vol. 13.

around each. As a consequence, fluke disease is common." Concerning post-mortem appearances he notes among other changes (page 571) "The stomach is always more or less deeply congested, but I have observed no ulceration. *The liver often presents a mottled appearance, due to circumscribed irregular areas of necrosis.*"

As regards the pathogenic organism, he describes what he considers to be the characteristic organism as being present in the effusions, organs, and even in the blood itself, but never in a state of purity. He further adds (page 572): "*The necrosed liver areas also show the characteristic bacilli in great numbers.*"

Regarding the disease in Tasmania, he says (page 570): "The liver is very often congested, *and may show yellowish necrotic areas.*"

The italics in the foregoing quotations are mine.

It is evident that the necrotic hepatic lesions were looked upon as secondary in character, for no experimental work appears to have been done with them. The materials for animal inoculation being blood and exudates, it follows that the bacilli he saw in sections of hepatic necrotic lesions were not necessarily identical with those obtained from the blood and exudates of the same animal or animals, in view of my own experiences.

The indications are pretty clear that black disease in New South Wales and the braxy-like disease in Victoria and Tasmania are identical. Now, seeing that Gilruth definitely claimed to have isolated the causal organism of the latter disease, it is evident that it should be identical with that isolated from black disease. I have had opportunity of examining two different lots of material containing the bacilli isolated by Gilruth, and find that they are not the same, either morphologically or culturally, as those isolated from cases of black disease. This being the case, one has to explain the difference. Reference to my first article will show that in the early period of the investigations my results agreed with those of Gilruth bacteriologically, but it was subsequently shown that the bacilli that had been isolated from sheep found dead, although death had only recently taken place, could not be acknowledged the indisputable cause of the disease. Later on it was shown that they were agonal or post-mortem invaders, as proved by their absence from blood, tissues, &c., when such were removed immediately the animal had been *seen to die*. On reading Gilruth's articles one cannot avoid the conclusion that the same thing happened in the case of the Victorian and Tasmanian investigations, viz., that the bacteria claimed to be the causal organisms were obtained from animals from which the possibilities of post-mortem invasion could not be excluded.

Regarding the identity of the Australian disease with European braxy or bradsot, the matter is more difficult to approach. The bacteriological findings of a number of writers afford little aid in the solution of the question. Some were undoubtedly dealing with post-mortem invaders, whilst others had not eliminated that possibility. As regards the disease seen on the continent of Europe, there is still dispute as to the etiological factor. Here again some of the writers were undoubtedly working with cadaver

bacilli. It would greatly simplify matters if it could be shown that whatever bacilli were isolated, they were obtained from animals immediately they were dead, and that means were taken to prevent any secondary contamination of the fluids or tissues, this being an important consideration. In spite of these uncertainties it would appear that braxy or bradsot have a number of features in common as regards climatology and morbid anatomy, if one disregards the obvious post-mortem phenomena in connection with the latter; but (and this I consider to be an important difference) I have not been able to discover any reference to the presence of liver lesions in descriptions of the disease either in Great Britain or on the Continent. If these are really absent, then one must conclude that either the disease is not identical with that seen in Australia, or that the port of entrance of the bacilli is not the same, and that the carrier can therefore hardly be the liver fluke. On the other hand it may be that the liver lesion or lesions have been overlooked by those making the examination, or they have been viewed as merely of secondary importance, and attention has been directed elsewhere, as, for example, to the abomasum. It will be evident that microscopical examination of, or cultures made from, any portion of the liver, save from the necrotic foci themselves, would be entirely negative if means were taken to avoid agonal or post-mortem invasion. The fact that a bacillus, which has been isolated from blood, exudates, or organs of sheep found dead, is very fatal to experimental animals upon parenteral inoculation, is no proof that it was the causal agent of the disease, because it is well known that quite a number of anaerobic cadaver bacilli are highly pathogenic when so injected.

It is rather strange that, although investigators have known of the fallacies introduced by working with cadaver bacilli, yet until the writer pointed it out, no one working on braxy or its allies appears to have realised the primary importance of the fact that in research work on diseases of this nature in sheep, one should always be assured that the organisms isolated were present in the body (in the strict sense of the word) before death, unless it can be shown that invasion of the body itself is not necessary for the organism to produce its pathogenic effects. Of course, it has to be admitted at once that if the fluke is capable of acting as a mechanical carrier of one species of bacterium to the liver, there is no reason why other species may not be so transmitted, given the opportunity. The writer therefore hopes that this aspect of the method of infection in the type of disease discussed in the present article may be given consideration by workers on braxy and bradsot, and also in the condition met with in various parts of Australia and elsewhere, in order that the writer's hypothesis may in their particular cases be either established or disproved.

Summary.

Black disease is a condition apparently peculiar to sheep, and seasonal in occurrence.

It is a toxæmia, running an acute course. The primary lesions are situated in the liver, and consist of circumscribed areas of necrosis. One or several lesions may be present.

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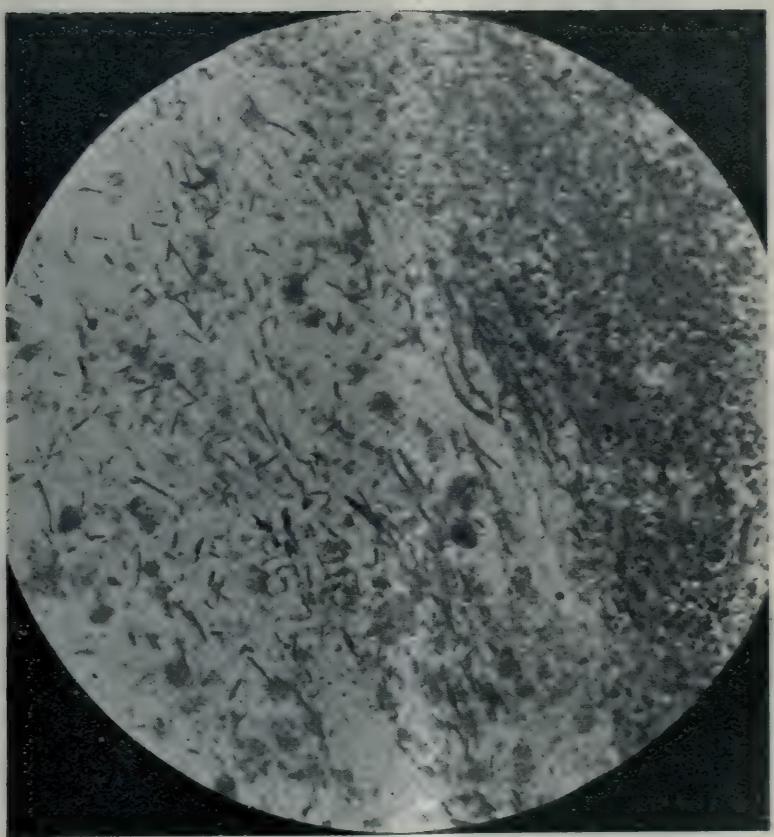
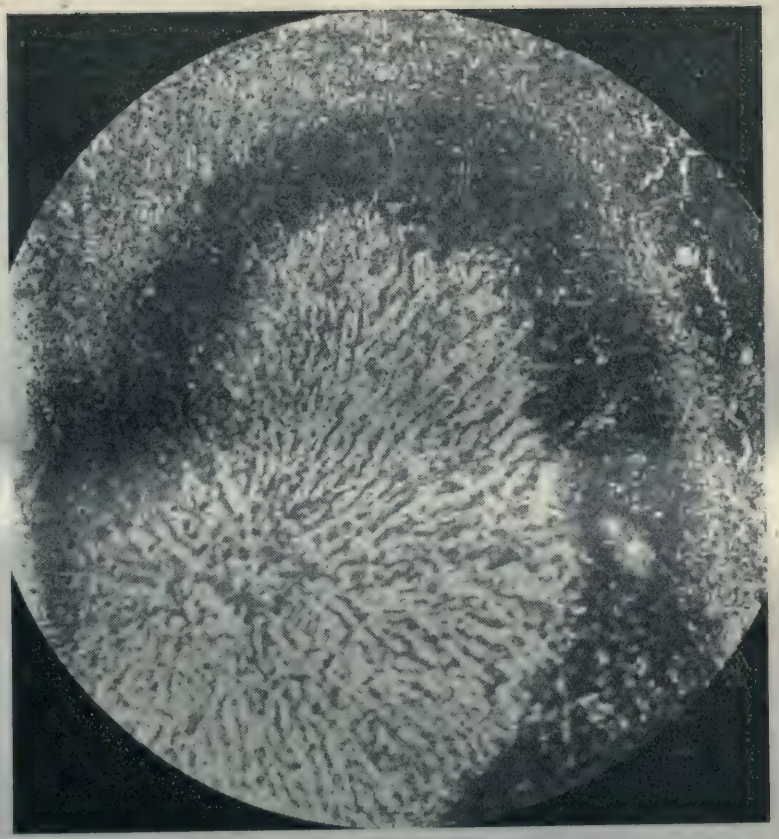


Section liver lesion, Case 53, stained claudius; showing necrotic area and zone of leucocytes, the bacilli being grouped in masses around the periphery, and also scattered throughout the necrotic portion. Obj: 6 m.m. No. 2 Oc: 55 c.m. x 400.

Section of necrotic liver lesion, Case 52, stained claudius and hæmatoxylin ; showing large necrotic area, with masses of bacilli grouped around the periphery and individual bacilli scattered throughout the body of the lesion ; also zone of leucocytes, and immediately beyond that normal liver tissue. Obj : 16 m.m. Oc : 2. 55 c.m. x 145.



Section of liver lesion, from Case 53, stained hæmatoxylin and eosin ; showing central necrotic area surrounded by dense zone of leucocytes ; outside this is normal liver tissue. Ob : 16 m.m. Oc : 2. 55 c.m. x 145.

Photographs by R. Grant.

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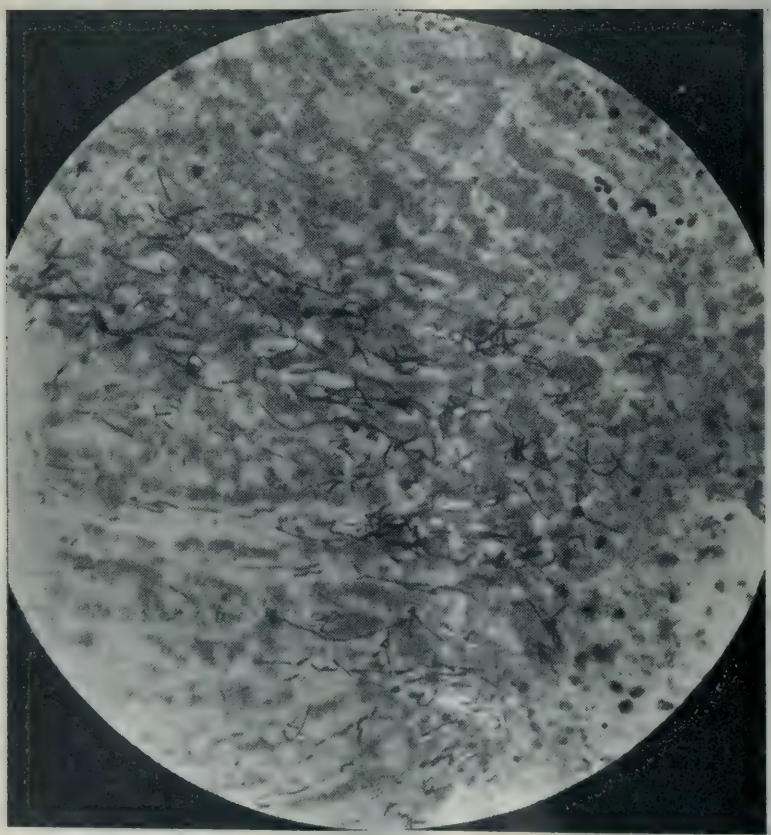
Culture from hepatic necrotic focus. Case 30, twenty-four hours liver piece broth; claudius stain. Obj: 6 m.m. Oc: 2. 55 c.m. x 400.

Twenty-four hours liver piece broth culture from subcutaneous exudate, guinea pig 147; claudius stain. Obj. 6 m.m. Oc: 2. 55 c.m. x 400.



Portion of necrotic area in hepatic lesion, Case 52 ; showing the filamentous character of the massed bacilli ; claudius stain. Obj : 6 m.m. Oc : 2. 55 c.m. x 400.

Other lesions seen elsewhere must be looked upon as secondary and probably due to the action of the toxin produced by the bacilli in the primary lesion and distributed in the blood stream.

The primary hepatic lesions contain the causal organism, which at the time of death are confined thereto and cannot be demonstrated elsewhere even in the liver, save for a few exceptional occasions in which no gross necrotic foci were seen but the bacilli were found to be present in that organ. Such cases may be looked upon as ones of mass infection, the defences of the organ having been overwhelmed before they could come into action.

The causal organism is one of the larger anaerobic bacilli, which sporulates readily, and is probably a facultative parasite.

Experimental inoculation of virulent cultures is fatal to sheep and other animals, and the lesions are anatomically those of black disease, the apparent difference being due to the port of entrance of the bacilli and the nature of the tissues there. (Compare contagious bovine pleuro-pneumonia.)

The situation of the primary lesion or lesions, and the failure to infect by feeding experiments with virulent cultures or viscera of affected animals, suggests the probability of a carrier, and the seasonal character of the disease, the geographical features of infected paddocks and the presence of fluke disease, indicates that the liver fluke is the mechanical carrier.

Black disease is probably identical with the braxy-like diseases in Tasmania and Victoria, although the organism claimed to be the cause of the latter is not identical with that isolated from the former. Until more definite information is obtainable regarding braxy or bradsot, in which the possibility of post-mortem invasion has been eliminated, it is not possible to decide whether the European disease is the same as that seen in Australia. It is, however, quite probable that it is.

[The accompanying photographs are by Mr. R. Grant, Bureau of Microbiology.]

The Uses of Sulphur.

Sulphur enters very largely into the composition of plants, and most soils contain it in only limited quantities, so that at first sight it would appear that its application should have a beneficial effect on growth. This would probably be the case were it not for the fact that the atmosphere contains quite an appreciable quantity of sulphur, some of which is carried to the soil in the rain. Many fertilisers, particularly superphosphate, contain a fair amount of sulphur. These various sources provide sufficient for the needs of most plants

While in some cases the application of sulphur to the soil in this State has apparently stimulated growth, as a general rule it has made no appreciable difference.

Sulphur is an extremely useful fungicide, and is largely used in the control of fungus diseases, particularly those which affect fruit trees and grape vines. Its value in this direction led the Department to experiment with it for the treatment of smut in wheat, but it has proved unsatisfactory for the purpose.—A. H. E. McDonald, Chief Inspector of Agriculture.

The Pre-soak Method of Treating Seed Wheat for Bunt.

The dipping of seed wheat in copper sulphate (bluestone) or in formalin, as recommended for the treatment of bunt, is accompanied by a reduced and retarded germination. As a result of his investigations, Mr. H. Braun, of the U.S. Department of Agriculture, came to the conclusion (*Journal of Agricultural Research*, July, 1920) that the adoption of what he terms the pre-soak method largely or entirely removes these drawbacks.

The pre-soak method consists of dipping the seed in water for ten minutes at, say, 6 a.m., and then draining and covering with bags for six hours. At noon the seed is treated in the ordinary way with copper sulphate or formalin, drained and again covered for six hours. At 6 p.m. the seed is spread out to dry over night, and is ready for sowing the next morning.

To test the value of this method a series of experiments was carried out at Hawkesbury Agricultural College with a sample of Hard Federation wheat, from which all small and obviously broken seeds has been removed by hand. The dipping solutions used were (1) that recommended by this Department, namely, 1½ lb. copper sulphate to 10 gallons water, followed by dipping in lime water, and (2) formalin, 1 lb. to 40 gallons of water. Tests were made with these solutions both by the ordinary and the pre-soak methods. All seeds that floated were removed.

The results of the experiments with seeds sown in moist soil and in dry soil one week before watering, may be summarised as follows :—

Slight improvements were found in germination and germination-speed when the pre-soak method was used with copper sulphate, as against the ordinary method.

No improvement resulted from the use of this method with formalin.

Owing to the extra work the pre-soak system involves, the results obtained do not justify its adoption with copper sulphate. With formalin its use appears detrimental.—W. M. Carne, Lecturer in Botany, Hawkesbury Agricultural College.

An Affection of the Mouths of Sheep.

"The animals affected have swollen nostrils and mouth, more than twice their ordinary size, and they are practically unable to eat. The general opinion throughout the district is that it is caused by eating the black thistle, but as there is a distinctly bad smell from the nostrils and they are mostly smeared with blood, it occurred to me it might be a disease."

The reply to a letter in such terms from the central western district, stated that such conditions are not uncommon when animals are feeding among prickly vegetation. The small wounds so caused are likely to become infected with organisms of various types, particularly if any of those which cause necrosis are present in the paddocks. If it is possible, the sheep should be moved from the paddock in which they became infected; the affected ones should be picked out and kept in a handy place where water and soft food are available, and the mouths and nostrils dressed with a solution of condy's crystals in water. The solution should be a fairly deep red colour. If a small syringe is available, a little of the solution could be syringed into the nostrils, but this should not be over-done, or some may be forced into the lungs.—S. T. D. Symons, Chief Inspector of Stock.

The Value of Soil Analyses to the Farmer.

F. B. GUTHRIE AND R. M. PETRIE.

THERE is, and always has been, much difference of opinion regarding the value to the farmer of an examination of his soil. On the one hand, the view has been expressed that the chemical composition of the soil is a reliable guide to the nature of the manuring required. On the other hand, opinions equally emphatic have been voiced that an examination of the soil (usually called soil analysis) is not only of no value but positively misleading.

The trouble is probably due to the use of the term "soil analysis" and the different interpretations placed upon it. Those who believe that an analysis of the soil consisting only of the determination of the chemical plant-food is no guide to the manurial requirements of the soil are perfectly correct. This view of the matter was expressed by one of us (F.B.G.) as long ago as 1895, when, in an address before the Australasian Association for the Advancement of Science in Brisbane, it was pointed out that an examination of a soil, to be of any benefit to the farmer, should take into account the texture of the soil, its behaviour towards water, &c., thereby suggesting means by which any defects might be ameliorated, and by which the soil might be brought into the most fertile condition possible and into such a state that it could utilise to the best advantage any manures added.

This fact has been borne in mind in connection with soil examinations carried out by the Chemist's Branch of the Department ever since, and recommendations for manuring are never based on the quantities of nitrogen, potash, and phosphoric acid present in the soil. In fact, determinations as to quantities of these constituents are seldom made, and only in cases where the applicant expressly desires such information, or where the information is required for such scientific purposes as fixing different soil types, or for our own information. Out of 246 soils examined during the last twelve months, these determinations have only been made in twenty one cases. Manures are recommended as the result of departmental experience with the different crops in different districts.

The examination of soils as conducted by this branch of the Department is more in the nature of an investigation than an analysis, the object being to reveal to the farmer the defects in his soil, such as sourness, stiffness, presence of plant poisons, lack of humus (organic matter), or of lime, &c., and to advise as to proper treatment, in order that benefit may be derived from subsequent manuring. Such a soil analysis is of value in determining changes which take place in the soil under certain conditions, and in comparing one soil with another, all of which work assists in the study of the effect of changing the physical condition and the effect of cropping. The knowledge so obtained can later be practically applied to help the farmer to obtain better and larger crops.

The usefulness of a laboratory examination (so-called analysis) of a soil lies in the indications it affords as to sourness, alkalinity, presence of excess of salt, poor water-holding power, lack of humus, lack of lime, need for drainage, imperviousness to the passage of water, tendency to set hard on drying, presence of hard-pan, presence of toxic substances, suitability to different crops, general poverty in plant-food, excessive proportion of any ingredient such as clay, sand, peat, or stone, and power of nitrification.

The determination of the percentage amounts of the plant-foods nitrogen, phosphoric acid, and potash does not afford any information under the above important headings, is in any case a process too laborious to be carried out invariably, and is only made in the exceptional cases mentioned previously. It is no guide whatever as to the nature of any necessary manuring, which depends in the first place on the nature of the crop, and (in a lesser degree) on the district and the climate. Neither is it any guide as to the suitability of the soil for different crops.

Soil examinations on the rational lines described, and as carried out by this branch, should always precede recommendations for manuring, as it would be quite idle to expect manures to exercise any benefit on soils possessing some of the physical defects enumerated. That such an examination is of value is evidenced by the very considerable number of soils forwarded for examination.

It is a matter for regret that there is no soil survey branch of the Department of Agriculture in this State as in other countries. Such a branch could establish type-soils in different districts, and refer soils under examination to one or other of such types, the characteristics of which had been previously established. Such surveys would be of very great advantage in determining the nature of the different soils in areas to be subdivided into farms, and in valuing the soil from the point of view of its agricultural possibilities. All such subdivisions should be preceded by a soil survey properly carried out.

Seedling Oranges, Sixty-Four Years Old.

Mr. H. Malcolm Findlay, Arcadia, *via* Hornsby, forwards particulars of some orange trees sixty-four years old, with the comment that in view of the fact that the trees were seedlings the details might be of interest to other orchardists. The trees were planted on 12th November, 1857, and after being worked for twelve years were deserted, the fence surrounding them being broken down and burnt by bush fires. After a lapse of fifteen years the trees were re-worked and cared for up to six years ago, when they were neglected again Last year they were worked again, and sprayed for wax and louse in February with a spray made up of 5 lb. soda, 1 gallon miscible oil, and 40 gallons water. This year the trees made new growth of 6 to 9 inches, making their present height 20 feet, and the diameter near the ground 17 feet. They carried six to seven cases of oranges, and in years gone by always pulled ten to fourteen bushel cases. The present state of the trees is perfectly sound. The fruit, except for what grows on the top, is more or less marked with maori and melanose, but the flavour is excellent.—W. J. Allen.

Methods of Maize Breeding for Increase of Yield.*

H. WENHOLZ, B.Sc. (Agr.), Inspector of Agriculture.

PROBABLY over 90 per cent. of the maize-growers in Australia selec their seed maize in the barn at husking time, with little or no accurate knowledge of any definite relation of type of ear to yielding capacity. A comparatively small number of progressive growers select their seed in the field before or at harvesting time, and thereby effect some improvement in yield if they do it with care, and very few farmers indeed work on a reliable system of breeding by which yields can be definitely increased.

Much work has been done in America to show that there is little or no correlation between type of ear and yield, but these results have lately been questioned on account of the known suitability of certain types of maize to regions differing markedly in climatic conditions. In New South Wales a vast amount of evidence is being collected to determine what ear characters, if any, are correlated with yield for particular varieties which have become well established in different districts on account of their high yielding capabilities. The work of some experienced growers in selecting to a certain type over a long period of years, and in evolving thereby a fairly well fixed type which outyields other varieties of different type on their own farms, suggests that there is some kind of broad correlation between type and yield for a particular locality, or for a definite set of local conditions. The fact that many of these long continued selections have resulted also in repeated prize winnings at local agricultural shows suggests that there is some relation between show points and yield in well-established types in a locality.

In view of the repeated proof of lack of vigour and diminution in yield resulting from self-fertilisation or close fertilisation in maize, it would seem that distinctive varieties, like Boone County White and Reid's Yellow Dent particularly, which are American varieties of high uniformity and with good show points, are of too homozygous condition to be high yielding, but this is not the case.

In spite of the vigour derived from coupling heterozygous characters, such as would be possessed by different types as generally accepted, it appears then, as if there is some maintenance or improvement in yielding capacity by the long continued selection of a certain type of maize for certain local

*Paper read before the Agricultural Section of the Australasian Association for the Advancement of Science, Hobart, 1921.

conditions. If this is correct, the only objection to improving a variety of maize in yielding capacity by this means of simple selection is the long time necessary to get this well-established type.

To begin with a variety of maize consisting of a number of somewhat different types is to take many years to evolve a well fixed type, and to begin with a fairly well fixed type is to risk the unsuitability of the type to local conditions.

With a uniform strain or variety of maize which yields well in a district, selection of ears of the true variety type will probably do all that is necessary in at least maintaining or perhaps slightly increasing its yielding capacity. In such circumstances the ear-row system of breeding a variety of maize does not offer much hope of effecting any marked increase in yield. This is explained by the fact that where great uniformity exists it does not make for very great differences in the yields of individual ears (such as are obtained in a variety of maize which contains many types), and therefore no easy elimination of poor yielding ears can take place.

At the present time, however, very few varieties of maize in Australia are in such a state that they do not show marked differences in type of ears, which differ in yielding capacity when submitted to the ear-row test. Uniformity within the variety has been brought to a high standard by American breeders in some varieties, and the ear-row test in such cases is being found to be of less value in increasing the yield of a variety of maize, and other methods are now being sought.

Before passing on to a brief description of these methods, there is something to be said in favour of field selection of seed, which has been shown to be a very profitable practice. There is little doubt about the advantage of selecting seed maize in the field over picking the seed ears in the barn, but the method which is considered to affect the yield more than any other is the application of the old principle of the "survival of the fittest"—in other words, the selection of ears from those stalks which grew in a full "hill,' and which were surrounded by a full stand (growing under competition), the ears being up to or above standard weight and size. This is the ideal to aim at in the field selection of seed maize. Increases of from 5 to 7 bushels per acre have been made in New South Wales from field-selected seed over barn-selected seed.

For the foundation of any seed maize plot, then, the field-selected ears are most desirable, and this practice could be more largely undertaken by maize growers with profit.

As stated before, in many cases (especially where varieties have been subjected to selection for uniformity of type for many years) the efficacy of the ear-row test for improving the yield is now being questioned in America.

A brief description of the ear-row method of breeding maize will not be out of place here. A number of ears are selected and rows of equal length about 2 or 3 chains long are planted from each ear at the same rate of sowing. As it takes only a small portion of each ear to plant a row, the

remnant ears are carefully kept till the following year, when the residues of the highest yielding ears, as determined by this test, are sown in a separate plot (breeding plot). This lays the foundation for an improved yielding strain of seed of the variety.

The chief objections which have lately been raised to the ear-row test in America are as follows :—

1. The male parentage is not regulated. Even the best selected ears have some mediocre sire or male breeding.

2. Too close breeding (resulting in loss of vigour) is brought about in the breeding plot, and thereafter by only four or five of the best "remnant ears" being used as the foundation stock of the improved strain.

3. Insufficient increases in yield (it is stated) have been recorded on comparing the improved strain with the original strain to which ordinary selection alone has been applied.

The new methods of maize-breeding which are now being developed in America, are based on the following points :—Self-fertilisation, if carried on for some time causes loss of vigour and diminution in size to a certain stage but no further. This stage is reached as soon as the selected individuals are either pure dominants or pure recessives, *i.e.*, homozygous for their many characters. All self-fertilised lines, therefore, become more uniform, but some lines do not lose vigour owing to consanguinity, as quickly or as much as others. In the recombination of such inbred strains increased vigour is at once restored, and a high yielding and uniform strain of maize is evolved which is said to be far superior to the original variety.

The advantages of this new system, which is referred to as "selection in self-fertilised lines," are apparently :—

1. Individuals with defective germ plasm suffer total extinction when self-fertilised for some time, though they may produce fair ears when bolstered up with cross-fertilisation. This is a valuable elimination of the unfit which it seems impossible to effect in any other way.

2. The greater uniformity of inbred strains and their combinations—when a line becomes homozygous for any character it always remains so.

3. Once the pure strains are obtained and the particular recombination which gives the best yield is established, the same result can be produced each time the cross is made.

The possible disadvantages of this system are :—

1. In any self-fertilisation, the amount of grain produced by a given maize plant is not visible until some time after fertilisation is effected. It may be possible to overcome this by establishing correlations between the field characters of the plant and the size or weight of the ear produced. This has not yet been done, and at present no likely correlation seems to exist.

2. Six to ten years self-fertilisation is required to bring a line to an homozygous and stable condition.

3. The methods involve considerable tedious work which an ordinary farmer would not have the time or the patience to undertake. Its use would therefore be restricted largely to experiment farms, where practically only one variety can be grown.

4. The skill of the operator or breeder plays a large part in the results obtained.

5. A large amount of material must be used; at least 100 ears are desirable to start self-fertilised lines. As the grain production cannot be judged until after fertilisation, it is necessary to self-pollinate four or five ears in each line, three of which should be grown, making at least 300 lines.

6. The selection of the poorest plants to be self-fertilised may mean the encouragement of defective or weak germ plasm, while the selection of the best plants tends to perpetuate plants in a heterozygous condition, which are usually the most vigorous.

7. The method of self-fertilisation in maize by the use of bags on the silks and tassels does not sufficiently safeguard the introduction of foreign pollen in the field during the act of uncovering the silks.

8. There is no definite correlation between the producing capacity of inbred strains and the progeny of the crosses produced from them. All possible combinations of the inbred strains have to be tried and tested. If twenty pure lines are produced, at least 380 combinations have to be kept isolated and tested for yield, as even reciprocal crosses do not always give the same result.

9. First generation hybrid seed from two inbred strains is at a serious disadvantage on account of its small size.

10. Double crossing (*i.e.*, the combination of two first generation cross-breds) to overcome the latter disadvantage adds another year or two to the time taken to make and test all the combinations, and means probably twelve to fifteen years at least to produce an improved strain of maize.

11. If the improved strain of maize is allowed to be grown for a few years, the vigour is lost, due to inbreeding or close breeding, and the yielding capacity becomes no better, perhaps worse, than that of the original variety. This possibility is likely with many farmers among whom the improved strain of maize would be distributed.

12. If the area devoted to the raising of pure lines is one or two acres, as seems at least necessary, substantial loss takes place for many years on a small farm, owing to the poor yields obtained from this area.

13. No definite figures have yet been shown comparing the strain obtained by the new system of breeding with the original variety, or with the variety improved by a good system of ear-row testing.

The objections previously raised to the ear-row test as a method of obtaining increased yields of maize may be expected to disappear under certain conditions. As long as substantial variations occur in the yielding

capacities of different ears within the variety of maize, it is contended by the writer that higher yielding strain of maize can be produced by this system.

The details of the ear-row method which is being continued in New South Wales (despite the introduction of these latest systems in America) have been altered slightly since its commencement, and the following description of the methods now being employed by the writer is given :—

Each year thirty-six ears, field-selected from the previous year's ear-row test, are submitted to the same test in rows about 3 chains long. These ears are the best that can be obtained (on appearance and weight), observing the precaution that no ear is selected except from a three-stalk hill and surrounded by a good stand. In this way each selected ear in the ear-row test has apparently some inheritance of yielding capacity behind it, at least on the dam or mother side. Occasionally an ear of exceptionally good appearance from another breeder of the same variety, or from a field area, is included in this plot which occupies about an acre in area. Until lately every fifth row was sown with bulk seed selected from the "breeding plot," but now this check row is sown alternately with an ear-row throughout the plot. Now the breeding plot, as before mentioned, is a small plot consisting of the best four or five remnant ears of the previous ear-row test. Of these, the progeny of the two highest yielding ears are detasselled and allowed to be cross-fertilised by the progeny of the next two or three highest yielding ears. From the detasselled rows in this breeding plot sufficient seed is usually selected to sow the check rows for the ear-row test next season, and to sow a special multiplying plot of a few acres. This multiplying plot is the plot from which the seed is selected to sow the whole farm area the following year.

As the ear-row test, the breeding plot, and the multiplication plot are continued each year, it will be seen that new and improved seed is produced each year in the breeding plot, and that each year also a new "strain" of seed is produced for the farm area. This method overcomes the objection that the breeding is somewhat close, and loss of vigor is likely to result after a few years from consanguinity, for fresh seed is produced for the farm each year.

Now it is readily allowed that consanguinity is not a danger in itself, provided the individuals mated are of robust constitution.

There may be a tendency to close breeding in the ear-row test on account of selection for uniform type which is more likely to contain homozygous characters, but this is to some extent obviated by the occasional introduction of good ears of the same variety from outside sources, and by the insuring of robustness or ability to yield from the method of field-selection practised.

Again, any ears in the ear-row test after the second year have to be very good to be able to beat the check rows in yield, which are sown with the best seed from the breeding plot, which in turn, as stated before, is sown with the elite remnant ears of the previous year's ear-row test. But some individual ears still are able to do this, and they are then eagerly made the breeding plot of the following season.

That stud seed from the detasselled rows of the breeding plot is superior to ordinary selected seed of the same variety, is proved by the following results which have been obtained in New South Wales to date :—

Locality.	Variety.	Season.	Yield per acre.		
			Stud Seed	Ordinary Selected Seed.	Per cent. increase in favour of Stud Seed.
			bushels.	bushels.	per cent.
Hawkesbury Agricultural College ...	Red Hogan	1916–17	78·26	67·33	16·1
Grafton ...	Leaming	1916–17	35·17	24·5	46·5
Yarramalong	Improved Yellow Dent..	1917–18	39·42	34·0	16·9
Kangaroo Valley ...	,, ,,	1917 18	76·34	67 33	13·3
Paterson	,, ,,	1917–18	104·28	87 0	20·1
Comboyne ...	Leaming	1918–19	60·9	51·31	16·7
Charity Creek ...	Improved Yellow Dent.	1918–19	78·4	72·0	8·4
Leeton	Funk's Yellow Dent ...	1918–19	20·44	17·32	18·3
	Average		61·40	52·38	19·5

That some ears in the ear-row test can still beat this stud seed in yield, and are then used as residues for the breeding plot the following year, shows that the maize-breeding work in New South Wales has been conducted on safe and sure lines up to the present. What the future will reveal is not apparent, but the ear-row test cannot be given up lightly in favour of something different until it is proved that it is not obtaining results.

It must be stated that, in the first place, the ear-row test has only been in operation on a variety of maize at the most for six years here ; but the present status (with the results achieved), overcome objections to the ear-row test as a means of improving the yields of a variety of maize which are being raised of late years in America.

There is, perhaps, this difference, that the varieties of maize in America, having been subjected to selection and ear-row breeding, are much more uniform than our varieties in New South Wales, and that the great differences we get in our ear-row test between the yields of the different ears are not in evidence there.

This may be so, but the details of the method for ear-row testing, which have been described here, are not known to have been practised in America and, while the varieties of maize which have been subjected to this system still out-yield nearly all other varieties which are pitted against them, and are rapidly becoming the most popular varieties in New South Wales and in other States, it is felt that the continuance of the system of breeding outlined is justified.

If the male bird in a yard of turkey hens has to be changed, it is not safe to regard the eggs as fertilised by the new bird until the hens have ceased to lay, and have started again.—James Hadlington, Poultry Expert.

Electricity on the Farm.

O. C. BALLHAUSEN, Dairy Instructor.

For some years schemes for harnessing the upper waters of certain rivers for the development of electrical power have been keenly advocated by competent authorities. Hydro-electric schemes on tributaries of the Clarence for the supply of electricity for industrial purposes for the whole of the north-eastern corner of the State have been given much prominence. The success of these schemes is predicted by expert engineers who have investigated them, and the only difficulty appears to be to find the money necessary for their development.

While these big schemes are under notice, it is interesting to see what can be done by progressive and ingenious farmers in a small way to provide cheaply all the power required on the average dairy farm. There are very many farms in the coastal areas, with permanent flowing streams, which could have all the advantages to be derived from a small hydro-electric supply. The benefits of electricity can easily be extended to the household for the provision of city comforts and conveniences, such as lighting, ironing, heating, and also cooling by means of fans, making farm life much more attractive, especially for the women-folk. There can be no question that the more attention is devoted to comfort and the making of farm life more attractive, so will the drift of the younger people to the towns and cities be appreciably lessened, with advantage to the State.

In 1914, Mr. J. C. Fredericksen, a dairy-farmer of Rous Mill, near Lismore, after seeing a fine little stream of water on his property practically running to waste for a number of years, determined to use this water to supply electric current to operate his farm machinery, and to light his house and outbuildings. Since that time, and from the same plant, the service has been extended to the house of his two sons living close by, and a still further extension is to be made to the houses of two more sons. The plant is probably somewhat larger than the average homestead is likely to require, but a plentiful supply of power at any time is a great advantage.

Since the erection of the plant in 1914, there has not been a mechanical hitch of any kind, and seeing that neither Mr. Fredericksen nor his sons had any previous experience with electricity, its simplicity apparent. It is as reliable as any other form of power on the farm. On two occasions when abnormally dry weather affected the flow of water in the creek, Mr. Fredericksen utilised his motor car for working the milking machines, raising the car from the ground and attaching a driving pulley wheel in the place of one of the back wheels. This was necessary for only a few weeks, and of course the lighting of the house was affected, but for such a brief time as hardly to be worth consideration.

A brief description of the electric plant and its uses might be of value to others contemplating a similar service.

A small wall of stone and cement was constructed across the creek on a stony bottom to impound or dam the water and give the necessary weight. This is situated just above a small waterfall. From the bottom of the dam

A Hydro-electric Plant on the Richmond.

The pipe-line, pelton wheel, and dynamo as seen when erected in 1914. A shed was in course of erection when the photograph was taken.

the water is carried through 210 feet of 10-inch wooden pipe to a pelton water-wheel. The vertical fall from the dam to the water-wheel is 76 feet, and by means of a large water valve the force of the water on the wheel is regulated.

The diameter of the pelton wheel is 3 feet 6 inches, and by using a 3-inch delivery nozzle 17 horse-power is obtained from the wheel, while a 2-inch nozzle will develop 12 horse-power at 300 revolutions per minute. By the use of still larger water cups on the wheel it is estimated that up to 25 horse-power could be obtained.

The 12 horse-power delivery is used for driving, by belt connection, a 6½ horse-power generator at 1,500 revolutions per minute, thus supplying 240 volts, or more than sufficient for all the lighting, &c., of three houses and all the power required on the farm.

A 5 horse-power electric motor near the dairy operates the milking machines, a 6-cow-plant, milking over 130 cows, as well as separator, lathe, grindstone, and a saw bench for firewood and for board sections for banana boxes. At one of the sons' homes a 3 horse-power motor is used for corn-shelling and for the shelling of bush-nuts, of which from 2 to 2½ tons are secured annually from an acre of trees. The bails and dairy, in addition to the houses, are all electrically lighted, and in the houses the current is also used for fans, radiators, hot water urns and ironing.

The system is a direct current one, and no storage battery is used, so a method had to be devised for obtaining the current quickly, and without a long walk to and from the creek to turn on the water. By means of a double wire, supported by small pulleys on opposite sides of the electric cable posts, and by a wooden roller in the dairy, the operation of the generator is controlled at the creek a little over a quarter of a mile away. The wires are connected with the water valve, and by winding the roller in one direction one wire is wound on to it which causes the valve to open and permits the water to turn the wheel. By turning the roller in the reverse direction the other wire is wound on to the roller, closing the water valve and thus stopping the machine. A similar contrivance erected near the house verandah, and connected by branch wires to the main wires, is used in the same way, and avoids the necessity of a walk to the dairy to start or to stop the wheel when bed-time arrives.

Mr. Fredericksen has included banana growing in his farming operations during the past two years, and the plants are now bearing well. All the banana cases are made from trees growing on the farm. A small sawmill, with 2 and 4 foot circular saws, has been placed to drive direct from the pelton wheel—17 horse-power being used for this work. By means of a small short tramline, the logs are run down the creek bank to the little sawmill, and after being cut into boards are again hauled up, the power required for hauling the little truck being obtained from the water wheel.

The cost of the whole plant, inclusive of the milking machines, but exclusive of the sawmill (which was mostly made on the farm), was approximately £600, but the plant is larger than most farmers would require. The total cost per annum for providing all the power and lighting, which includes belt renewals, lubricating oils and all costs, is well under £5. The total cost for oil alone for the seven years has been under 30s. Interest

and depreciation are not included, but the life of the pelton wheel, generator and motors can be regarded as indefinite, as, after seven years' use, they are as good as when they were first set in motion.

For water supply to the house, water troughs and dairy purposes a water ram is used, delivering, 1,200 gallons each twenty-four hours from tho creek. The delivery to the house is equivalent to a vertical lift of 280 feet No other method of pumping water is so cheap as this, and it meets all the requirements of the place. It is surprising that so very few dairy farmers make use of this simple and reliable contrivance for providing a plentiful supply of water for general farm use.

So many advantages are to be derived from an electrical and pumping equipment of this kind—the comforts and independence, the simplicity and long life of the machinery, the low cost of upkeep, &c.—as compared with ordinary forms of farm power, that any farmer having the facilities in the way of water supply, is simply not alive to his own interests if he neglects to make use of them, according to his ability.

New Farmers' Bulletins.

The following additions have recently been made to the list of bulletins published by the Department of Agriculture :—

No. 58, Hides, Skins, and Sundries (Second Edition). Price, 10d. post free.
No. 136, Neutralisation of Over-ripe Milk for Cheesemaking. Price, 10d. post free.
No. 137, Safeguarding Farm Stock from Disease. Price, 10d. post free.
No. 139, The Culture of Sugar Cane in New South Wales. Price, 10d. post free.
No 140, The Pruning of the Vine. Price, 10d. post free.

These bulletins are obtainable from the Government Printer, Phillip-street, Sydney.

An Injured Teat and the Treatment.

"A dairy cow (an extremely heavy milker) has had one of her quarters badly cut on barbed wire. It has all healed again, but half-way up the teat it has left a small hole, from which milk is continually dripping. The cow is being dried off in the hope of the injury being cured when there is no flow of milk to interfere with it."

The writer of the foregoing was thus advised :—I would not advocate treatment until the cow is dried off, and even then it may not be very easy to close this fistula ; but in order to assist it I would recommend you, when she is dry, to take a perfectly clean knife and scrape the edges of the hole until the blood just shows ; then with a fine needle and thread put a stitch in the outside skin of the teat and draw the sides of the hole together. Leave the stitch in for a few days, washing the teat each day with boiled water with a very little disinfectant in it, and then remove the stitch when it appears that the opening is closed. Make sure that everything used is very clean.—S. T. D. Symons, Chief Inspector of Stock.

Co-operation for Farmers.

[Concluded from page 559.]

C. C. CRANE, B.A., Organising Inspector of the Agricultural Bureau.

In order that a co-operative undertaking may at all times be conducted on the strictest business principles, and that all the steps in its formation may be conducted methodically and formally, the following plan of procedure is suggested as a model on which communities may act. Formality is necessary in order to promote confidence, and to guarantee that the venture proceed along lines clearly understood, so that suspicions of ulterior motives on the part of organisers and active workers may not arise.

The Beginnings of a Co-operative Society.*

The initial work is to interest a few men of the right type as a nucleus, and to instil in them the ideals and objects of the proposed co-operation, at the same time reducing the proposal to a practical form, and defining as approximately as possible :—

1. What the proposed co-operative society is calculated to effect.
2. The amount of capital that will be required.
3. The number of shares that will have to be issued.
4. The amount of capital that can be actually subscribed, and the amount that may have to be raised by loan.
5. The method to be adopted to secure the loan.

These few interested men should then allot among themselves the district proposed to be canvassed. They should be able to guarantee that every resident likely to be interested has had the matter carefully explained and has been invited to become a shareholder, to indicate how much share capital he would be prepared to contribute, and further to attend a public meeting to inaugurate the society. They should appoint one of their number to be the provisional secretary, and empower him to make arrangements for holding a public meeting.

Public Meeting.—This should be held as soon as convenient after the canvas of the district. It would be well at such a meeting to secure the services of one or two practical co-operative experts, whose hints and instructions would possibly help the venture to steer clear of pitfalls.

The business of the first public meeting should be :—

1. To adopt a motion that a co-operative society be formed.
2. To collect names of intending shareholders and deposits on capital.
3. To appoint provisional officers (president, secretary, and treasurer, and a committee of from three to seven.

* In the compilation of this portion of the article I have had valuable assistance from Mr. Grierson, Manager of the New South Wales Co-operative Wholesale Society.

Of these officers, the secretary is the one on whom the brunt of the work will fall, and in making a selection it is essential :—

1. That he be a progressive man.
2. That he have a good practical knowledge of book-keeping, accounting, and financing.
3. That he have a good grip of practical co-operation.

The secretary will be the official representative of the members, the mouthpiece of the shareholders. He will not be a permanent official, but should be elected annually. He should be approachable and tactful, and capable of inspiring confidence.

The First Committee Meeting.—In preparation for this the provisional secretary should obtain for the members of the committee :—

1. A copy of the New South Wales Building and Co-operative Societies Act of 1901. (Obtainable from the Government Printer, Sydney.)
2. Copies of rules, books, and by-laws of co-operative societies running on parallel lines. The New South Wales Co-operative Union has prepared a model set of rules which would be applicable to any such society.
3. Any other information that would facilitate the business of the first committee meeting being carried out intelligently.

The business of this first committee meeting should be :—

1. To define the objects of the society.
2. To draw up a code of rules, standing orders, &c.
3. To arrange for the registration of the society. This can be done free of charge through the Registrar of Friendly Societies, 36 Young-street, Sydney.
4. To decide on a site for commencing operations.

The First Regular Meeting of the Co-operative Society.—The proposals of the committee should at the earliest opportunity be referred to the members of the society at a meeting of all members. The business of that meeting should be :—

1. To confirm the appointment of officers and committee.
2. To debate the proposed objects, rules, standing orders, &c., and to adopt a set for the direction of the society.
3. To decide on a policy.
4. To enrol shareholders.
5. To receive further deposits on capital.

The Second Committee Meeting.—At this meeting it would be proper—

1. To consider the commencement of operations.
2. To consider the appointment of a manager.
3. To call applications for a manager.

The Manager.—This officer of the society should approximate the following ideal:—(1) He should have a sound business knowledge of co-operation. A man with a business training would quickly acquire co-operative knowledge. (2) He should have business honesty and integrity (these are preferable to brilliancy). (3) He should be progressive, but zeal and earnestness if misdirected and unaccompanied by business knowledge make more for disaster than success. (4) He should have a good practical knowledge of book-keeping and accountancy. (5) He must be tactful, for he will have to administer the whole business.

It is better to let the manager grow with the business than to try and build a business up to the manager. At the same time, a cheap manager is not to be recommended, for good brains are required for management, and they must be paid for.

It must be remembered that: (1) The committee must be largely guided by the manager in the matter of stocks and plants. (2) The manager should co-operate with the committee in all things. He should be admitted to all committee meetings, enter freely into discussion, but exercise no voting power. (3) The committee must lay down the policy on broad lines, and give the manager clearly to understand that they require him to act upon the lines indicated by them, the ultimate control of the society being retained in the hands of the committee. (4) The appointment, control, and discharge of assistants should be left to the manager, but assistants should have the right of appealing to the Board against the manager's action within one week of the event. Wherever possible, the manager's position should be upheld, but provision should be made in the rules that in the event of serious error on the part of the manager, he should be dispensed with and the assistant retained.

The Third Committee Meeting should proceed:—

1. To appoint a manager.
2. To appoint an auditor. A fully qualified man should be engaged and paid for his services, as many co-operative societies go to the "Co-operative Cemetery," through lack of professional auditing.
3. To enrol members.
4. To collect further deposits on capital. (This work may now be continuous.)

After these initial meetings the committee should meet regularly according to rules. An annual general meeting must be held at which the election of office-bearers should take place.

General Considerations.

It is best to commence trading with the usual co-operative lines, subject to the necessary modifications to suit local conditions, and to extend gradually as capital becomes available.

It is wise to commence and continue the society on a strictly cash basis, that being a sounder, simpler, and more economic class of business. In cases where it would be inconvenient, there should be provision that members who wish to obtain credit must have a separate trading account (approximately an advance account), which really means that the customer pays in advance. Some societies allow each member credit not exceeding three-quarters of his paid-up share capital, but, of course, if money has to be raised by loan on the security of capital not paid up, this method becomes involved.

Generally speaking, credit custom is to be avoided , for it is poor economy and it becomes a dangerous policy in the hands of a weak or careless manager.

As much share capital as possible should be obtained, the minimum holding being sufficiently small not to exclude possible members, for in a co-operative store any discrimination of class, creed, or colour must be sternly repressed. In a cash concern £5 should be the minimum, and in a credit concern £10 to £15, unless, of course, the alternative plan of separate trading capital be selected. £250 in shares is the maximum amount that a member can hold under the act.

If all the capital necessary for preliminary operations can be obtained by subscription so much the better. If not, it may be obtained as a loan on the security of uncalled capital or on the individual guarantee of one or more of the members.

As under the act each member's liability is limited to the unpaid balance of the shares allotted to him, and as he has the right to withdraw his share capital, the unpaid capital does not always present the best security, although the act does provide that a member's liability remains till twelve months after his withdrawal from the society.

A rule fixing the maximum amount of interest payable on capital should be made. The actual amount to be paid will be left to the discretion of the committee, and is usually the prevailing market rate.

The store should not attempt to cut prices, except in such cases as may demand it. Sell the best quality, full weight, at current prices. After paying overhead charges, &c., refund the surplus to members *pro rata* on their purchases. The store should be considered a social movement. It is to be run for use, not for profit. If it represents financial gain so much the better. The store should be looked upon as the A.B.C. or kindergarten of the movement.

All societies should affiliate with the Co-operative Union, the organisation which undertakes the legal, educational, and propaganda work of the movement. To affiliate, each society takes up one £1 share and then pays ½d. per annum per shareholder. This is in direct accord with the principles of the Rochdale movement, for even the pioneers allotted a certain regular amount for education and propaganda.

Affiliation with a Co-operative Wholesale Society.

All societies should affiliate early with a co-operative wholesale society. Such a society will afford protection against combinations of proprietary interests, enable the inexperienced buyer to buy on the same footing as the more experienced one, and give the store the same privileges as the co-operative store gives to the individual member.

Generally speaking, each society in such a co-operation should take up, say, one £2 share for every member, increasing the number of shares as its own members increase. The capital could be called up as required, say 1s. per call, and not more frequently than say once a quarter. A refund of any profit must be made to the affiliated societies, of course, though such profit might usefully be applied to the increase of the capital.

Flood Deposit that Corroded Wire Netting.

A sample of soil from the Western Land Division, described as being brought down by the Bulloo flood waters and having a disastrous effect on any wire-netting about which it lodges, was recently forwarded to this branch for analysis. It was remarked that the effect of the soil was to remove all the galvanising from the wire, and the question was whether the wire could be treated in any way to counteract the action of the soil.

The soil gave a strongly alkaline reaction to litmus paper, and a water extract gave the following results:—

1.049 per cent. chlorine, equivalent to	·081 per cent. sodium chloride.
Sulphates	Faint trace.
Lime	Nil.
Magnesia	Nil.
Alkalinity (as sodium carbonate)	·097 per cent.
Total water soluble salts	·27 „

The corrosive action of the deposit was certainly due to the high alkali content, and dipping the netting in or painting it with a mixture of equal parts of coal tar and Newnes pitch (made by heating both together) would be the cheapest and most effective method of protecting it, but whether it would be either practicable or economical would have to be considered. City firms quote coal tar at 4½d. per gallon (84s. for 224 gallons), and Newnes pitch at £14 per ton.—F. B. Guthrie.

To Make Liquid Manure.

Soak a sugar bag of fresh cow, pig, or poultry manure for a week in 50 gallons of water. Use this at the rate of one part for three parts of fresh water. The same bag of manure will make another 50 gallons by using one part of the liquid to one part of fresh water. A third quantity of 50 gallons may then be prepared and used neat. Each 50 gallons should be a week old before using.

This form of liquid manure is all that is necessary for most growing crops used weekly. Apply 4 gallons to every 18 feet of a running row. No further stimulants need be added.—E. N. Ward, Superintendent, Botanic Gardens.

Is the Seed Buyer entitled to Protection?

Every seedsman's catalogue contains what is known as a "non-warranty clause," which states that while every care is taken to supply high quality seeds, the vendors accept no responsibility as to the growth, description, quality, or productiveness. The only protection the buyer has is the desire of reputable firms to preserve their good names. The question whether such protection is sufficient is being freely discussed in many quarters just now. The following experiences with seed purchased from seedsmen suggest that the buyer is not sufficiently protected:—

Egyptian Turnip-rooted beet seed produced many plants more resembling mangels than beets. From so-called Succession cabbage seed a miscellaneous collection of cabbages of various types were raised, about one-half of which belonged to the Succession variety. Two different lots of Savoy cabbage seed gave plants many of which showed evidence of being crossed with smooth-leaved cabbages. Less than one-quarter of the plants raised from a packet of Early Short Horn carrot were true to the variety, the remainder being of the Intermediate type.

Seeds may lack in germinating capacity as well as in trueness to name. This has been noticed in onions. Green Feast peas sown in the same ground and at the same time as Yorkshire Hero failed to grow while the latter have done well. The most striking case of bad germination recently was with two packages of Earliana tomato seed. Samples were obtained from two different seedsmen and tested; one gave 20 per cent. and the other 70 per cent. germination in eight days. The poorer seed was sown at the same time as some seed of last year's purchase which had been very successful. The poorer seed has given less than half the germination of the other, and the seedlings are weak and have only made about half the growth of the sturdy young plants from the better seed.

No striking cases of bad seed have recently been noted in farm seeds, but several cases during the past year are worth noting. A sample of white sweet clover produced more lucerne than clover. Another of rye gave an effective germination of 65 per cent., as against which 85 per cent. is a fair standard. In still another case, Black Hull-less barley was sold to a farmer as skinless barley, and as such sown by him.—W. M. Carne, Lecturer in Botany, Hawkesbury Agricultural College.

Beans and Cauliflowers at Orange.

"What are the prospects of cauliflowers and beans in a district like ours?" wrote an Orange reader. He was informed as follows:—

Both cauliflowers and beans can be grown in the Orange district, but frosts will, of course, make the cultivation of beans only possible during the warmer months of the year. If intended for Sydney markets it will be well to note that during the winter the market is more or less glutted with local beans if the season is at all favourable.

The climate is quite suitable for cauliflowers, but success will depend upon the quality of the soil. In the Bathurst district, where the vegetable is so largely grown, the alluvial flats are selected for the growing of the crop. There is usually a good market for this vegetable, which is available during the winter months. Attention must be given to protecting the heads from frost.—A. J. Pinn, Inspector of Agriculture.

The Shot-hole Borer.

(*Platypus omnivorus* Lea.)

W. W. FROGGATT, F.L.S., Government Entomologist.

THERE are a number of small beetles which damage timber and which are popularly known as " borers." They attack it in various ways. Thus, the powder-post beetle (*Lyctus brunneus*), previously dealt with in this journal (page 273, 1920), reduces the sapwood of many Australian timbers to dust, while a second group of beetles, represented in Australia by *Anobium domesticum*, also remain in the infested timber for years, burrowing through and through it in successive generations until there remains nothing but a shell covering a honeycombed mass, somewhat like wood that has been ravaged by white ants. I have had timber under observation in a building for over ten years, and the *Anobium* beetles and their larvæ can still be found at work in the originally infested boards. Mr. C. French, junior, in a paper, " Furniture and Timber Boring Insects " (*Journal of Agriculture of Victoria*, 1918), calls *Anobium domesticum* the " pin-hole borer," but I would limit the popular name pin-hole borer to the beetles that cut direct burrows through the timber they attack and that do not reinfest it over and over again, as does *Anobium domesticum*.

Under the ordinary conditions of forest life, when a tree is damaged it sickens and dies in the scrub, or it is cut down by the timber-getter. The decay or fermentation of the sap of the bark attracts all the wood-boring beetles in the vicinity. Some come simply for food and eat the surface, others to both feed and lay their eggs upon it, while many beetles themselves bore directly into the trunk.

There are a number of small wood borers that can aptly be called shot-hole borers; they bore circular burrows straight into the timber through the bark, and of these *Platypus omnivorus* is a typical example. The infestation of the timber by the true shot-hole borers may take place in the forest or brush before the fallen tree is hauled to the sawmill, or while the logs are lying in the sawmill yards previous to being cut up, or even after they have been sawn up and while the boards are seasoning in the stacks under the sheds.

The genus *Platypus* was formed by Herbest in 1793, for some European wood borers, and all the species of the genus were described and figured by the French entomologist Chapius in his " Monograph of the Family *Platypedæ* " in 1865. These beetles are widely distributed over the forest areas of the world, but they are most numerous in the forests of North and South America and in the Malay Archipelago. One species has been recorded from New Zealand, and three from Australia. The species now discussed

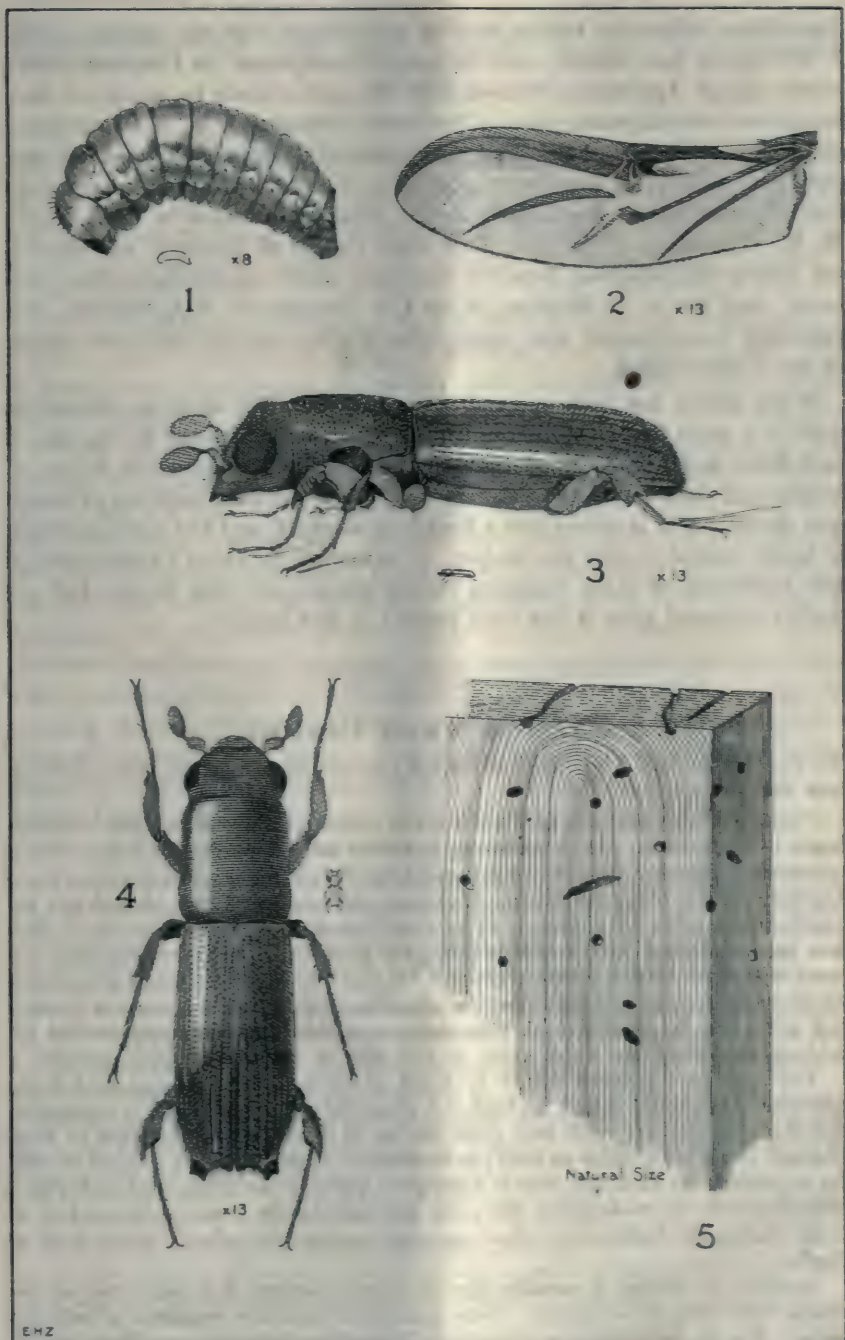
was described by Lea from Tasmania, and I understand from him that this is the first record of it from the mainland. French has described and figured a Malayan species (*Platypus corpulentus*) obtained from timber in a Melbourne timber yard (" Handbook of Destructive Insects of Victoria," pt. v., p. 81, pl. 80); but so far as I know it has not become established in Australia.

Our common shot-hole borer (*Platypus omnivorus*) is widely distributed through the New South Wales coastal forests, commonly known as " brushes" or " cedar brushes." My observations on its habits and life history were carried out last summer at a sawmill where large quantities of brush timber trees are cut up in boards and lengths for the manufacture of furniture in Sydney factories. The principal timbers damaged by these beetles are beech (*Trochocarpa laurina*), blackwood (*Acacia melanoxylon*), corkwood (*Schizomeria ovata*), sassafras (*Doryphora sassafras*), and coachwood (*Ceratopetalum apetalum*).

These beetles are not noticeable during the winter months, but are very active in December, January, and February. They not only penetrate the sapwood, but bore into the solid material of the logs for some distance. They also attack the newly-sawn boards while they are drying, but when after exposure for a month or so, the sap has dried out, the timber loses all its attractive properties and the borers leave them alone. When I visited the sawmill in the middle of February there was a stack of damaged boards drying in the shed; these were just in the condition attractive to shot-hole borers and there were numbers of beetles in burrows formed in the wood. On some of the boards the beetles were busy laying their semi-transparent rounded eggs in the ends of burrows in contact with neighbouring boards, and on other boards we found the active larvæ, while the outside of the stack was showing signs of attack by beetles that had made their way in from the surrounding forest. We soon made a large collection of the beetles by taking each board and pushing a dry grass stem into some of the burrows, thus forcing the inmates out into the killing tube.

The beetle is a typical cylindrical borer, of a general dark reddish-brown tint. The front of the head and prothorax are almost black, the legs reddish-brown, the apex of the wing covers clothed with stiff yellow hairs, curiously serrate at the tips, as shown in the figure. The beetle measures a little over 4 m.m. in length. The whole structure of the beetle—its cylindrical form, the head flattened in front, the curious shape of the shovel-like tibia of the fore legs, and the brush of coarse hairs on the extremity of the wing covers—is adapted to its mode of living, by boring through the timber and brushing out the waste dust as it excavates its burrow.

Forest entomologists in Europe and North America have studied the habits of a number of species found in these parts of the world, where an immense amount of damage is often caused to timber in the pine forests. The general experience of these investigators is that preventive measures are the only ones that have met with any success; such measures consist of the removal of all dead and dying trees from the forest areas, and their



The Shot-hole Borer (*Platypus omnicorus* Lea).

1. Larva. 2. Hind wing. 3. Side view of the perfect beetle. 4. Dorsal view.
5. Timber, showing the damage caused by the borer.

destruction before the beetles develop and emerge from the infested wood. I. M. Swaine has written some important monographs on Canadian bark-beetles (Dept. Agriculture, Ottawa, 1917–18), and in these he points out that forest fires provide much material for beetle infestation. W. J. Chamberlin, of the Forest Branch of the Oregon Agricultural College, has carried out and published records of some very interesting observations on the pine bark-beetle (*Dendroctinus brevicornis*) in the great pine forests of that State. M. W. Blackman, of the New York State College of Forestry, has studied the habits of *Pityogenes hopkensi* and other allied species that attack the larch; and Dr. A. D. Hopkins, of the U.S. Department of Agriculture, has published many papers and monographs dealing with the shot-hole borers of the United States.

When timber has been cut and is stacked, it is still liable to infestation until it is quite dry. The beetles can, however, be kept away by the use of carbolised sawdust sprinkled beneath the stack and between the layers of boards and battens as they are stacked. A 5 per cent. solution of water and carbolic acid is mixed into a bucket of sawdust, and the moist sawdust is freely sprinkled over the timber. A sawmiller to whom I recommended this treatment of sawn seasoning timber informs me that he has had no timber damaged after it has been treated in this manner.

A Question about Carrots.

To a correspondent who asked about the production of carrots, the following was supplied:—

Practically any soil can be fitted for the cultivation of carrots, but a sandy loam is preferable. It is necessary that the soil be worked to a fine tilth; otherwise difficulty may be experienced in obtaining a good germination. Care must also be exercised in manuring, and stable manure should not be applied just prior to planting, as this will produce forked roots; land that has been manured with stable manure for previous crops, however, may be used with little fear on this account. Of the artificial fertilisers a mixture of superphosphate and bonedust in equal quantities, at the rate of 3 cwt. per acre, can be applied with advantage, and this may be supplemented by adding any available wood ashes to the plot in order to supply potash.

The seed can be sown either by hand or by means of a hand seed-drill, planting to a depth of half an inch. A plentiful supply of water is necessary for the best quality roots, and after sowing it is often an advantage to firm the soil slightly in order to help germination. If germination is good it will be necessary to thin the plants lightly to prevent wedging, and a further thinning can be made when the roots are sufficiently large to be used as a soup vegetable, leaving the final spacing between the plants about 3 or 4 inches.

Sowing in spring is usually the most satisfactory, but sowings can be made well into the summer. Four pounds of seed are required to sow an acre. For an early crop on shallow soils the best varieties are Early Horn or Early Nantes, but for deeper soils the longer varieties may be used and Intermediate may be recommended.—A. J. Pinn, Inspector of Agriculture.

Experiments for the Control of Armillaria Mellea.

W. A. BIRMINGHAM, Assistant Biologist, and W. B. STOKES, Fruit Inspector.

RECOGNISING the loss and damage caused by the honey fungus (*Armillaria mellea*) in citrus orchards, the Department, three years ago, thought it desirable to institute a series of experiments to see if some cheap and easy method of control could be found.

The co-operation of a grower in the St. Ives district was sought, and he readily agreed to place the desired number of trees at our disposal. The experiment was commenced on 1st May, 1918; but the tedious nature of the work exceeded our expectations, and the work of preparing the trees for the different treatments was considerably prolonged. The experiment was confined to orange trees, and the preparation consisted of loosening the soil with a fork and clearing it away from the butts and main roots of the trees with small forks, trowels, &c. Infected roots were either sawn off close to the butt or cut through with a chisel or sharp tomahawk, and then traced out for some considerable distance, lifted, and placed in a heap ready for burning. On a superficial observation it frequently appeared that all the diseased tissue had been removed, but a closer examination often revealed that portions of the fungus had been left. It was repeatedly found, on clearing the soil away from the underside of the butt that the fungus had obtained a good hold there. Most of the trees were in a very advanced stage of infection, some having to be propped up after having the diseased roots cut away.

The following specifics were tested :—

1. Bordeaux paste (1½ lb. bluestone, 1 lb. quicklime, 2 gallons water).
2. Bordeaux paste—plus an excess of lime to make into a thick paste.
3. Lime-sulphur (Neptune) 1 to 5.
4. Sulphate of iron, 10 lb. to 10 gallons of water, 10 gallons per tree.
5. Slaked lime, 30 lb. per tree.
6. Sercsol, 10 per cent. solution painted on butt and main roots; 5 per cent. solution watered over the soil.
7. Qua-sul, 1 per cent. solution painted on butt and roots and watered over the soil.

Three trees were treated in each case with the exception of Qua-sul, where only two were used owing to shortage of solution. Three trees were kept as controls, the diseased parts being removed and the trees left untreated.

Tar brushes were used for applying the different specifics, and small paint brushes were convenient for getting into crevices. The butts and main roots were left exposed to the air for three days before replacing the soil. The trees were examined and re-treated in 1919 and 1920, and finally examined on 10th May, 1921, when the experiment was terminated, as the results obtained did not warrant its continuance.

The Results of the Experiment.

Only two trees showed no spread of the fungus from the commencement of the experiment—one tree having been treated with lime and the other with lime-sulphur. These trees were only slightly infected at the commencement of the experiment, and in all probability every trace of the disease had been removed. One tree treated with Sercsol showed no further spread in 1921, but had shown it in both previous years. The control trees all showed spread of the fungus.

Taking into consideration the fact that only two trees out of the twenty treated showed no spread of the fungus, and considering the work involved in the preparation and treatment of the trees, the Department is unable to recommend any treatment based on the results of this experiment. Another series of experiments has already been put in hand, but some considerable time must elapse before any conclusions can be drawn.

Control Measures Recommended.

It is hardly possible to adopt effective control measures, but it is desirable that every means possible be taken to get rid of all stumps and roots before an orchard is set out. In districts where the pest is known to exist it might be advisable to sow newly-cleared land to some grain or other field crop (with the exception of potatoes, as they are susceptible to attacks of the fungus), for several years previous to its use for orchard purposes. In such cases care should be taken to see that the humus-content of the soil is not depleted.

When a tree is found in the early stage of attack the soil should be removed from the butt and main roots, the diseased bark at the butt removed with a sharp knife, and all diseased roots traced out as far as possible and removed and burnt.

It is recommended that when replacing the soil a fair proportion of the root-system be left uncovered (say 18 inches from the butt all round) for an indefinite period. Where possible, affected trees should be isolated by digging a trench 2 feet deep around them, such trench to be outside the spread of the root-system. All soil removed in the operation should be thrown on the inside of the quarantined area.

Trees found in an advanced stage of the disease should be immediately removed, as they are beyond treatment and are a source of infection to adjacent trees. When a tree is attacked in a new plantation it should be sacrificed at once. When trees are removed they should be burnt on the spot, the soil turned over, and a generous dressing of quicklime applied. The area should remain unplanted to fruit trees for a considerable time (several years, if possible), and in the meantime the soil should be repeatedly turned over and exposed to the sun. Lack of drainage favours the disease. When a tree is slightly affected there is every reasonable hope of its recovery with special and constant attention.

[The subject is well illustrated in Plant Diseases Leaflet, No. 18, of which copies are obtainable free on application to the Under Secretary and Director, Department of Agriculture, Sydney.]

Cheesemaking on the Farm.

J. G. McMILLAN, M.B.D.F.A., N.D.D., Dairy Instructor.

INTRODUCTION.

So frequently are applications addressed to the Department for information concerning cheesemaking on the farm and in the household that it has for some time been felt that articles presenting such information in compact and non-technical form would supply a very positive want. An effort has been made in the following pages, therefore, to deal with the subject in popular style, and as concisely as is consistent with the demands of the aspects discussed. The Australian is not, as a rule, a connoisseur of cheese, and although the fact may be attributed to various causes, the prime reason, one suspects, is that the article on the market is often inferior in flavour and therefore unpalatable. Our consumption of cheese per head is lower than that of any other white people. Yet 1 lb. of well-ripened cheese is equal in food value to 3½ lb. of lean meat, and the briefest study of comparative costs will show that the cheese is by far the cheaper food. Many people complain that cheese is indigestible; but while the charge may be admitted against an unripened article, it must be said that well-matured cheese is so easily digested that it is specifically recommended by some physicians for dietetic troubles. Moreover, cheese is not so heating to the blood as meat, and is therefore to be commended, if for this virtue alone, in such a climate as ours. For persons engaged in heavy manual work, such as miners, quarrymen, &c., it is an especially valuable food product.

Cheese (of which there are over one hundred different kinds) may be classified under three main headings—namely, (1) pressed varieties, (2) blue-veined varieties, and (3) soft varieties. It is proposed here to deal with numerous kinds of cheese, the manufacture of some calling for a certain amount of skill, and of others very little. The variety demanding most ability is cheddar, and this will be dealt with in a comprehensive manner, as many of the pressed cheese processes are simply modifications of the cheddar method. The same care of the milk is required whatever the variety of cheese, however. At present the bulk of our cheese is manufactured in large factories, but a fair quantity is nevertheless made on farms, and, provided the same skill is employed in its manufacture, it may be said that a better cheese may be made on the farm than at the factory, owing to the cheesemaker having the milk under direct control from the time of drawing. Taking one year with another, it is safe to say that a farmer who manufactures the product of from sixty or seventy cows into cheese will have a better income than if he had separated the milk and sent the cream to the factory. Where only a few cows

are kept, other varieties of cheese than cheddar can be manufactured, while even the householder with only one cow may be a manufacturer on a small scale by converting his surplus milk into cheese for his own use.

To the dairyman who contemplates making cheese in fairly large quantities it will be obvious that his maker should preferably possess some skill to commence with, rather than that he should gain it at the expense of his employer and the product. It is wise to aim at producing a good cheese from the very beginning—not to let an improving but mediocre article militate against its manufacturer's reputation even for a little while. If the intending cheesemaker has a son or daughter of, say, 17 or 18 years of age, he would be well advised to send him or her for a few months to some good factory, applying to the Department subsequently for a few days'

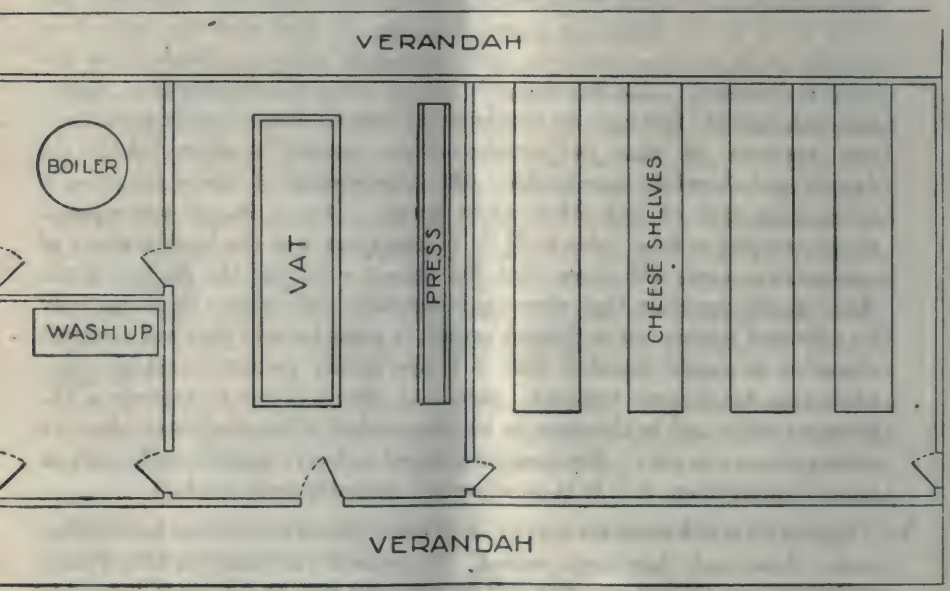


Fig. 1.—Plan of a small dairy.

tuition actually on the farm. The wisdom of such a plan was evidenced in the case of a northern rivers dairy-farmer recently. This gentleman's daughter went to a factory for a few months, and the writer assisted her not long ago for a day or two when she commenced work in her father's dairy. She is now turning out one of the best makes of cheese in the State; and even during the period when butter was selling at a more favourable price than cheese, her returns from cheese were considerably bigger than if she had sent the cream to the factory.

The Arrangement of the Cheesemaking Dairy.

The cheesemaking dairy should consist of three apartments—the manufacturing room, the curing room, and the boiler room. The manufacturing room should measure about 16 feet by 16 feet, and the curing room should

be of similar size, both with walls 10 to 12 feet in height. The boiler room may be separate from the main building; it should be built of corrugated iron or situated under a verandah. Figure 1 shows a dairy with the making and curing rooms alongside one another on the ground level; but in Fig. 2 is shown a dairy with the curing room underneath, an arrangement sometimes to be preferred, as indicated presently.

Situation.—The dairy should be situated in an elevated position, either on the top or near the top of a hill, thus allowing of good drainage for sewerage and the easy transit of whey by gravitation to the piggery or wherever it is utilised. Another advantage of such a situation is that should the water supply be obtained from a well there is less danger of contamination by soakage. The building should be at least 200 yards from a piggery where not more than twenty-five pigs are kept; where the number is greater than this the distance must be 300 yards. These distances are in compliance with the regulations of the Dairy Industry Act of 1915. Calf-feeding pens or poultry yards should be a considerable distance away, and even the cow yard should not be too close, the object of these precautions being to avoid, as far as possible, danger of infection through dust particles.

Construction of Making Room.—Most farm dairies are built of wood (mainly because of cheapness), and wood is satisfactory provided that the internal walls are lined with some impervious material, such as fibro-cement or galvanised iron, to a height of 6 feet. Conformation with this demand also is required by the Dairy Act. The rest of the walls and the roof should also be lined, and on top of the ceiling there should be placed several inches of (preferably) charcoal or dry sawdust to assist in keeping the room cool. A good cement floor ought to be laid, with sufficient fall to allow all water to flow off easily into the drain.

The Curing Room.—The curing room may be constructed similarly to the making room, but both walls and ceiling must be insulated. A badly-constructed curing room may ruin even the best manufactured cheese. A curing room of the dimensions given should have at least two windows, and these should be double ones, so that there will be a dead air space. They should be hinged, opening outwards like a door, and should be fitted with felt around the sash to ensure absolute tightness when shut.

An Underground Curing Room.—Probably the best plan is to build the dairy so that the curing room constitutes a sort of cellar (see Fig. 2), three sides of the lower half of the building being then entirely covered with earth (except perhaps for spaces for small windows), and the fourth (which should face the south) covered, except for the portion occupied by the doorway. When the building is constructed on a slope this is easily accomplished, there being comparatively little excavating to do, as the soil removed can be thrown against the building.

To build this cellared structure, it is necessary to construct the underground half (the portion to be in contact with the earth) either of reinforced cement or brick, taking care to finish off the outside of the walls as presently described before actually banking up the soil. Allowance for ventilation of the curing room should be made while the underground halves of the walls are in process of being built, and this is best done by building in two bends of galvanised tin pipe 6 to 8 inches in diameter, pieces of straight pipe sufficiently long to reach beyond the eaves of the completed building being added to these subsequently, and the inlet shaft furnished with a cowl. Any portions of the shafts to be covered with earth must be painted with biturine or tar. The cellar walls should be furnished with a damp-course, and they should finally be covered on the outside (when sufficiently dry) with a special tar preparation to keep out the moisture, and floated on the inside with cement, finished off perfectly smooth. The cellar door should be of cement: it should have a good surface and be provided with a tile drain with a trap inlet, so that rats and mice may be kept out and bad smells prevented from rising.

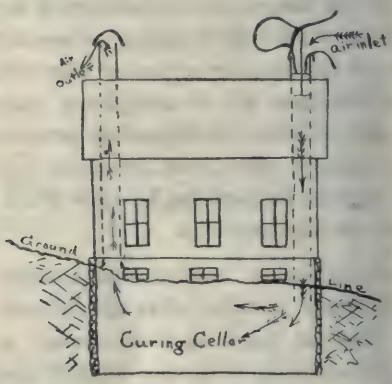


Fig. 2.—Curing room, partially underground; showing the system of ventilation for the cellar.
(*After Decker*).

The brick or cement portion of the walls properly set, the construction of the making room is proceeded with, stairs, of course, eventually connecting the two rooms. As the top half of the building (the making room) will not be in contact with the earth, the walls of this portion may be of timber, but these walls, as well as the ceiling, must be constructed on the lines already described. The ventilator shaft inlet to the cellar should be fitted with wire gauze and a shutter for use on very hot days.

The building of the curing room on a partially underground plan has been particularly described, but while such a plan is to be preferred, there is no objection to the dairyman building entirely above ground so long as he takes every care that the construction is on efficient lines. For a curing room built above ground the system shown in Fig. 3 may be recommended as effective in keeping down the temperature.

The curing room shelves should preferably be of well-seasoned white pine or kauri, and should be rather wider than the diameter of the cheese (about 15 inches wide for 40 lb. cheeses, and 8 inches for 10 lb.). They should be made in one piece or they are liable to leave a ridge on the cheese.

Some General Requirements.

A verandah about 6 or 8 feet wide should be provided; if the curing room is on the ground level it may run entirely round the building. One side at

least of the verandah should be concreted, and the washing-up tub should be situated on this. Any remaining verandah space may be beautified by a few tree and stag-horn ferns, and in some handy space there should be placed a storage cupboard for salt.

It has been proved that one of the best and cheapest germicides is sunlight; in the making room particularly, therefore, there should be large windows, Windows, doorways, and all openings into the making room must be fly-proof, in compliance with the Dairy Industry Act.

Ventilation has already been mentioned in connection with the curing room; the ventilation of the making room should be provided for by ventilators cut in the ceiling; not, however, immediately over the making vat. These ventilators should be covered with gauze, and should be boxed over for about 18 inches on top as a protection from any falling sawdust or charcoal. In each gable end there should be a louvre at least 3 feet square, covered with very fine wire-netting.

Probably shingles make the coolest roof, but there is a certain objection to their use unless made of a special wood, owing to their effect on rain-water coming in contact with them. Fibro-cement slates make good roofs, but their use is costly. Iron, though not so cool as shingles, may be regarded as a sufficiently satisfactory roofing material. Guttering must, of course be erected for the conveyance of rain-water to a tank.

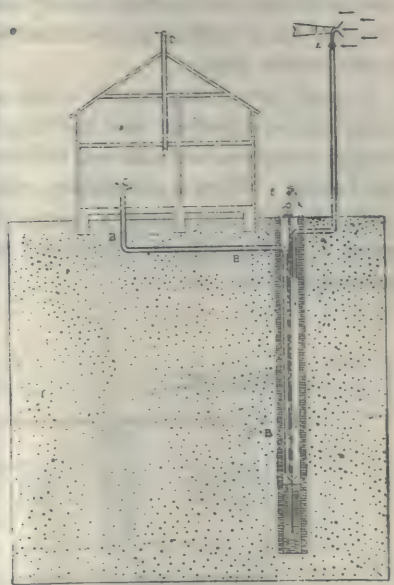


Fig. 3.—Section of curing room, built level with the ground.

Observe the horizontal earth duct connected with the well. A A, funnel taking air into the well. B B B, pipe leading air from well to curing room. C D, ventilator. (*After Decker*).

Wash-water constitutes sewerage as applied to the cheesemaking dairy. It is always advisable to provide an open concrete drain (at least 9 inches wide at the top to allow of easy cleansing) for the disposal of this. The drain should be so placed that all the washings will flow readily into it; the fall should be good and the outlet should be into a covered cesspit situated a fair distance from the factory, where, if the ground is porous, the water will readily soak away. The pit should measure about 4 by 4 by 4 feet, and on an ordinary farm dairy such a pit should last for years. If the water does not drain away rapidly enough, a second hole should be dug near the first and the two connected. If the ground is of a very non-porous nature, three holes of the size specified should be dug alongside in such proximity that only walls of earth 2 feet thick separate them. Through these dividing

walls, about 6 inches from the top, is run a connecting length of 2-inch piping, and from the bottom of the third hole, which must be almost filled with sand or gravel, is run a pipe out into the open. The walls of the holes should be lined with wood for about a foot down to prevent them from crumbling in, and each should be covered with timber and finally with a layer of earth. The water enters the first hole from the drain; the greater proportion of the sediment settles to the bottom of the hole, and the water gradually rises to the level of the outlet into the second hole. Thence it passes into hole No. 3, and so filtered and purified has it become by the time it has drained through this that there is little danger from letting it run off over the ground adjacent to the outlet pipe.

A good pure water supply is necessary for the cheesemaking dairy. Roof water can be collected; and the supply from a well is frequently satisfactory, though it is often brackish and liable to cause corrosion of utensils (particularly the boiler). When a gravitation supply can be obtained, it is, of course, the best. Water from dams is unsuitable either for use in the dairy or for the cows' drinking supply. Stagnant water is one of the greatest sources of contamination.

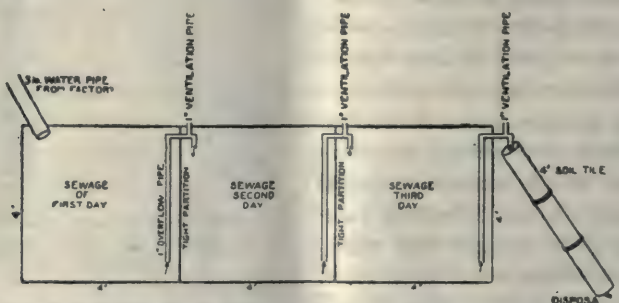


Fig. 4.—Series of cesspits, capable of treating sewerage from a factory dealing with the milk of seventy cows.
(After Van Slyke)

Plant Required.

Financial considerations will sometimes be a limiting factor in the purchase of plant for a farm dairy, but some articles are absolutely necessary. Following is a list of these, and it is recommended as an economy that they be of the best quality, for cheap tinware is soon corroded by the acids of whey and milk.

One 2-h.p. boiler (a 4-h.p. boiler would be better).
One oblong 200 gallon jacketed making vat with racks, curd-strainer, and rake.
Two curd knives.
One cheese press (either vertical or horizontal).
One curd mill.
Four 40 lb. tinned steel hoops.
Eight 10 lb. ,, ,, ,,
One 5 lb. ,, ,, ,,
One 3 lb. ,, ,, ,,
One pair of scales to weigh 5 cwt.
Two thermometers (one guaranteed accurate, to be kept for testing others.

Acid testing outfit, curd scoop, curd bucket, rennet, colour, bandage, caps, scrubbing brush, broom, &c.

The total cost of such a plant would be from £160 to £170. Opportunities often occur, however, of getting second-hand presses and mills in good order at much lower prices. Where wood is plentiful a large copper, to hold, say, 100 gallons, can be used in place of a steam boiler. This copper should have a pipe connected into the bottom to convey the hot water to the cheese vat; it should be built in with bricks and should be set high, so that the water will gravitate from it to the dairy. Such an arrangement is suitable only when a small quantity of cheese is made; for a fairly large dairy a copper cannot be compared with a steam boiler for cleanliness or convenience.

(To be continued.)

Plants which Produce Inflammation or Irritation of the Skin.*

Mr. A. J. Pinn, Inspector of Agriculture, referred to me Mr. Charles White, who had undergone much irritation of the skin of his arms caused by handling parsnips (*Pastinaca sativa* L.), the foliage of which continually brushed his fore-arms. This is the second occasion on which he has been troubled by this irritation. It remains for from three to four weeks, and during that time he has numerous watery blisters. Two other persons were similarly affected by the foliage of the parsnips.

I may say that I saw Mr. White, and he exhibited the skin irritation, and from what he tells me I am quite satisfied that in all three cases the foliage of the parsnips was the cause of the trouble. The scene of the occurrence was the West Maitland district, N.S.W.

So far as I know, no previous record of parsnip irritation has been recorded in Australia, and I find the following references in L. H. Pammel's "Manual of Poisonous Plants," pp. 126 and 663.

Persons are often poisoned by handling the plant, which causes inflammation and vesication. Mr. F. C. Stewart, in a letter to the writer, states that in one case the eyes became swollen; vesication occurred from poisoning caused by the flowers.

That the parsnip does at times produce dermatitis has been proven. The following very interesting letter from Professor F. C. Stewart, botanist of the New York Agricultural Experiment Station, is of interest in this connection :—

I recollect that some fifteen years ago you were much interested in the reputed poisonous properties of the wild parsnip, and that you reached the conclusion that wild parsnip is not poisonous. I think you may be interested to know of an instance which has recently come to my attention. Henry Van Dreser, a prominent lecturer on poultry in this State, last season had a very serious injury to his face and eyes. His face became badly swollen and his eyes were in a terrible condition. It was feared at the time that they would be ruined, but the sight was not lost, although it was considerably impaired. The physician in charge diagnosed it as a case of poisoning, due probably to the flowers of wild parsnip. Very shortly before the trouble appeared, Mr. Van Dreser had been mowing a large patch of wild parsnip which was in bloom. It was a hot day, so that he perspired profusely. He gathered bunches of the wild parsnip plants in his arms and carried them. This brought the plants in contact with his face. Both Mr. Van Dreser and the physician feel confident that the wild parsnip was the cause of the trouble. Another gentleman who heard of this case told me that some years ago he lost a little girl with poisoning of a somewhat similar character, and it was attributed to the parsnip blossoms, amongst which the little girl had been playing immediately before the attack.

The writer has also known of a few cases of dermatitis produced by this plant. Poisoning similar to the above may be produced by other members of this family, notably the cowbane A young high school lad in Boone lost his life in a way similar to that from *Pastinaca sativa*.

—J. H. Maiden.

*Previous reference, this *Gazette*, March, 1921.

Horticulture.

E. N. WARD, Superintendent, Botanic Gardens, Sydney.

The Kinds of Trees to Plant.

Not the least important consideration in planting trees for shade and effect in parks and reserves, or for shade and shelter for stock, is the choice of the right kinds. Planting close to the sea, but with shelter on the ocean side, is quite a different matter to planting on the ocean front. The low-lying areas, or those under 300 feet above sea-level, must be content with a smaller assortment than is available for higher altitudes. Nor can residents of coastal areas expect to grow the beautiful native trees of the western plains; neither will the plains raise the rich vegetation of the coast, however kind the cultivation might be. Districts with long frost periods must have special consideration, and all these several considerations are varied by exceptions, some districts having a large range of possibilities. For instance, the huge exhibit staged by the Northern Rivers' district at the last Royal Agricultural Show showed a range in fruit from the banana to the gooseberry.

Whenever any extensive planting is being considered, careful note should be taken of trees that are already growing well in the district in private or public places, and failing evidence of this kind, the advice of experts should be obtained.

Soil is another consideration, and sometimes aspect counts for a good deal; although these affect only certain families of trees, it often happens that from the many suitable subjects available, it is the exception that is chosen, with inevitable disappointment. Many who have admired the sugar gum (*Eucalyptus cladocalyx*) growing in the interior at such places as Leeton, on the Murrumbidgee Irrigation Area, have been led to plant them near Sydney, where they grow rapidly for a time but are not many years old before they begin to show how unhappy they are, owing to the ravages of the preying insects that usually attack the foliage of trees out of their natural environment. Many who visit Western Australia when the scarlet and crimson flowering gums are ablaze, come back with a determination to have some in their own locality, but they invariably get a row of uneven, unshapely trees altogether unsuited for street planting in the eastern states, though for group planting or as isolated specimens round the homestead they are capable of contributing colour to the landscape.

Qualities a Street or Road Tree must Possess.

It may be said that Sydney and its suburbs may be made to grow anything in the way of trees that will grow in Melbourne and Brisbane, so accommodating is the climate. You may see as fine an oak tree in the Sydney Domain

as any to be found in Melbourne, and just as good specimens of sub-tropical figs or *Ficus* as in Brisbane; but it does not necessarily follow that such trees will be suitable for avenue purposes.

Straightness of trunk and symmetry of branches, immunity from insect pests, the right amount of shade at the time of the year when shade is most wanted, submission to severe pruning in centres where overhead wires still appertain, must all be considered in selecting trees for planting. Cleanliness is another consideration, and by this it is not meant that deciduous trees should be discarded, for they make an ideal street tree for our climate, providing a maximum density of shade in midsummer, and allowing the sun to warm and dry the pathways in winter. There are trees, however, that are continually discharging either bark, leaves, twigs, flowers, or fruit, and which keep the paths in a state of untidiness and even of danger. Neither should tempting fruit or showy flowers be encouraged in the street or public places. Finally, the longevity of a tree must be considered. Often short-lived trees are chosen because they grow quickly, for, unfortunately, the long-lived kinds are not always quick growers. It is not surprising, therefore, that the range of choice for any particular purpose, whether in the city, suburb, or country, is extremely limited.

For Sydney and places with similar Climate.

The plane trees (*Platanus orientalis* or *P. occidentalis*) are difficult to beat when properly planted. Those round the central railway station at Sydney are an object-lesson in city street planting.

Higher above sea-level the deciduous sweet gum of Canada, sold under the name of *Liquidambar styraciflua*, should be planted. This tree is even more symmetrical than the plane and has the advantage of coloured foliage in the autumn. Perhaps there has not been a greater demand for it for street purposes because, to the Australian, its maple-like foliage does not in any way resemble a gum, while its shop name is too long for words.

Probably the most popular is the brush box, *Tristania conferta*, sometimes sold as *Lophostemon australe*, an evergreen and a native of the State. The above three are rapid growers.

In good soil the Cape chestnut *Calodendron capensis* will fulfil every condition required of a street tree, and bears a mass of beautiful flowers, which however, are not useful for cutting purposes. It possesses shapely outlines, and is only partially deciduous. In heavy soil our native turpentine (*Metrosideros glomulifera*) makes a handsome tree; its dark evergreen foliage is always attractive, and requires little training. *Ficus Hillii*, when better known, will probably become one of our most favoured street trees; it has bright green foliage, good upright habit, with a whitish trunk. This plant is sold by some as *Ficus nitida*.

Where upright-growing trees have to be preferred, the following three are recommended:—The native plum tree (*Podocarpus elata*), an evergreen, pleasingly foliaged tree, bearing a small fruit with the colour and bloom of

plums; the wheel tree, thus named because its flowers resemble wheels (sold as *Stenocarpus sinuatus*, and erroneously as *Cunninghamii*), has bright evergreen oakleaf foliage, growing upright like the native plum (*Lagunaria Patersonii*) with small pink hibiscus-like flowers and greyish evergreen foliage.

Where the altitude reaches above the 300-feet mark, the pin oak o America (*Quercus palustris*), the red oak (*Quercus rubra*), and the scarlet oak (*Quercus coccinea*) are worth while. Where good soil and proper cultivation can be given, the live or evergreen oak makes a handsome tree for wide street shade purposes. This is sold under the name of *Quercus virginiana* (sometimes as *virens*).

None of the above should be planted less than 30 feet apart—in most cases 40 feet would be better—and they should be planted alternately on the two sides of an avenue: that is, the trees should not be opposite each other, so that the shade shall be more evenly distributed. The ideal is to let each tree grow into a specimen, not into each other.

Three trees for suitable stock shelter are the coral *Erythrina indica*), the honey locust tree (*Gleditschia triacanthos*), and the pepper tree (*Schinus molle*).

Next month lists will be given of trees suitable for coastal places, for the extreme west, and for the cold tablelands.

Some Trees and Plants of Value to Bee-keepers.

There are, no doubt, some thousands of species of flowering plants which are of assistance to the apiarist, but the value of only a proportion of those has so far been determined. The following, however, have been proved to be of definite help in varying degrees :—

Inland districts generally.—Eucalyptus : Yellow box (*Eucalyptus melliodora*), white box (*E. hemiphloia*, var *albens*), red box (*E. polyanthemos*), red gum (*E. rostrata* and *E. tereticornis*), white gum (*E. coriacea*), sugar gum (*E corynocalyx*), stringybark (*E. capitellata* and *E. macrorrhyncha*), apple-box (*E Stuartiana*), peppermint (*E. radiata* and others), and woolly-butt (*E. longifolia*). Other trees, plants, and shrubs : Tree lucerne (*Cytisus proliferus alba*), black thistle (*Carduus officinalis*), pepper tree (*Schinus molle*), Cootamundra wattle (*Acacia Baileyana*), golden wattle (*A. decora* and others), silver wattle (*A. dealbata*), blackberry (*Rubus fruticosus*), various fruit trees, Cape weed (*Cryptostemma calendulaceum*), clover (*Trifolium repens*), lucerne (*Medicago sativa*), maize (*Zea mays*), and pumpkin vines.

Coastal districts generally.—Eucalyptus : Grey ironbark (*Eucalyptus paniculata*), broadleaf ironbark (*E. siderophloia*), grey gum (*E. propinqua* and *E. punctata*), spotted gum (*E. maculata*), white gum (*E. haemastoma*), flooded gum (*E. grandis*), swamp mahogany (*E. robusta*), red mahogany (*E. resinifera*), bloodwood (*E. corymbosa*), and tallow-wood (*E. microcorys*). Other trees, plants, and shrubs : Silky oak (*Grevillea robusta*), tea-trees, orange trees, clematis (*Clematis glycinoides*), maize (*Zea mays*), pumpkin vines, clover (*Trifolium repens*), black thistle (*Carduus lanceolatus*), wattles, and dandelion (*Taraxacum officinale*).—W. A. Goodacre, Senior Apiary Inspector.

Pure Seed.

Growers Recommended by the Department.

The Department of Agriculture publishes monthly in the *Agricultural Gazette* a list of growers of pure seed of good quality of wheat, oats, maize, sorghum, Sudan grass, potatoes, and other crops, in order to encourage those who have been devoting attention to this sphere of work, and to enable farmers to get into direct touch with reliable sources of supply of such seeds.

The list is compiled after inspection of the seed and report by a field officer of the Department (preferably during the growth of the crop), and farmers who have pure high-class seed of good quality of any variety of farm crop are invited to communicate with the Under Secretary and Director, Department of Agriculture, Sydney.

The Department does not undertake to buy any of the seed.

**Sudan Grass* :—	Manager, Experiment Farm, Cowra. Manager, Experiment Farm, Temora. J. Cavanagh, Curlewis.
Clovers :—	
Shearman's Clover (roots) ...	J. H. Shearman, Fullerton Cove, Stockton.
Maize :—	
Golden Glow	J. F. Chick, Hillview, Tenterfield.
Wellingrove (formerly Early Yellow Dent).	Manager, Experiment Farm, Glen Innes. J. S. R. Crawford, Emu Swamp, Orange.
Iowa Silvermine (formerly Silvermine).	Manager, Experiment Farm, Yanco.
Funk's Yellow Dent	Manager, North Bangaroo Stud Farm, Canowindra.
Boone County White	J. Chittick, Kangaroo Valley.
Leaming...	Manager, Experiment Farm, Grafton.
Golden Beauty	R. Richardson, Mondrook, Tinonee, Manning River.
Manning Pride	S. Smith, Karaak Flat, via Wingham.
Golden Nugget...	J. W. Smith, Wauchope.
Manning White	A. McM. Singleton, Henley, Sydney.
Large Red Hogan (formerly Red Hogan).	Principal, H. A. College, Richmond.
Craig Mitchell	W. D. K. Humphries, Muswellbrook.
Early Clarence	F. T. Dowling, Tumut.
Fitzroy (formerly Improved Yellow Dent)	D. J. Dorward, Tayfield, Cundletown. J. C. Duff, Mount George. P. Mooney, Dumaresq Island, Taree. W. Richardson, Dumaresq Island, Taree. A. McM. Singleton, Henley, Sydney.
Goldmine	A. Louttit, Moruya.
Yellow Moruya	A. Louttit, Moruya.
Golden King	E. Blackburn, Warkton, Coonabarabran.
Manning Silvermine	R. Dyball, junior, Taree Estate, Taree.
Grain Sorghums :—	
Feterita	W. D. K. Humphries, Muswellbrook.
Manchu Kaoliang	Manager, Experiment Farm, Bathurst.
Sweet Sorghums :—	
Saccaline...	Principal H. A. College, Richmond. Foreman, Veterinary Station, Glenfield.
Millet :—	
Japanese	Manager, Experiment Farm, Coonamble.

* Sudan grass should not be sown until all danger of frost is passed.

PURE SEED—*continued.*

Potatoes :—	
Satisfaction	O. E. Silk, Nimmitabel.
	J. D. Morse, Black Mountain.
Surprise	O. E. Silk, Nimmitabel.
Lucerne :—	
Coolah	R. J. Crossthwaite, Pilca Butta, Leadville.
Peanuts :—	
White Spanish	Manager, Experiment Farm, Grafton.
	Manager, Experiment Farm, Yanco.
	Manager, Experiment Farm, Lismore.

In addition to those tabulated a number of crops were inspected and passed, but as the growers failed to forward samples their seed has not been listed.

NOTE.—The Department of Agriculture has a small quantity of miscellaneous seeds, such as velvet beans, cowpeas, soy beans, pop corn and sweet corn, for distribution to farmers, and can also supply samples of several varieties of field maize for trial (including some new varieties from America and Africa). Application should be made to the Under Secretary and Director, Department of Agriculture, Sydney.

To Make Lemon or Lime Juice.

To make lemon or lime juice, the fruit is peeled and pressed, and after the removal of the pips, the juice is filtered from the pulp by squeezing in linen bags. While still fresh the juice is heated, and when cool, shaken up with a little talc, which will settle and can be filtered off. In order to preserve it, 10 per cent. of sugar is added to the juice, and it is then boiled for ten minutes; while still boiling, or nearly so, it is poured into sterile bottles and corked at once.

If a more concentrated juice is required, it can be obtained by evaporation after the processes of clarification and evaporation.—A. A. RAMSAY, Principal Assistant Chemist.

Horticulture in Western Australia.

UNDER the title "The Handbook of Horticulture and Viticulture of Western Australia," the Department of Agriculture, in the western State (with Mr. A. Despeissis, M.R.A.C., as author) has made available for its own fruit-growers a volume of 647 pages which touches pretty well every aspect of the subject. The first few pages inform us that all who have paid attention to the facts firmly believe that Western Australia "bids fair to eclipse the other States of the group as a fruit-producing territory." Its soil is virgin and ready to welcome a change from the age-long occupation of gum trees, its climate is consistent, it has the advantage of the experience of other Australian growers, is situated 1,200 to 2,000 miles nearer European markets, and offers a ready local market at profitable prices.

With such opportunities, fruit-growing should thrive in this new land of the west, and the present book, practical, comprehensive, and business-like, reflects the variety of fruits the country will grow, presents the most profitable methods, and describes and illustrates the fungus diseases and insect pests that have to be dealt with. The book has a very usable appearance, and certain defects in the sequence of the different articles are no doubt largely corrected by the very copious index.

Vineyard Notes for September.

H. L. MANUEL, Viticultural Expert.

Preparations for the Spraying Season.

We are now approaching a period when all spraying apparatus should be overhauled and put in order, and arrangements made for supplies of bluestone and lime, so that the necessaries of the spraying season may be on hand in good time.

Downy mildew under favourable weather conditions is such a quick mover that if left unchecked it can do an enormous amount of damage in a very short space of time. The object of the spray is to kill the spores as they alight on the vine, and so to prevent penetration and germination inside the plant tissues.

No risks should be taken as regards spraying. Gambling on weather conditions is a foolhardy policy. Nor will any sound business man consider the infinitesimal cost of spraying, compared with the loss likely to attend neglect of this work.

Last season, in some parts of the State where spraying had been neglected, the ravages of this disease were heart-breaking. On several vineyards hardly a berry was vintaged. In the face of this, it behoves every grower for his own and his neighbours' good thoroughly to attend to the spraying operations.

Marking Out.

It is necessary for almost obvious reasons that a vineyard be set out on regular and symmetrical lines. Irregularly spaced rows (or vines in the row), and rows that are not strictly parallel, greatly hamper the subsequent operations of surface cultivation and spraying. To a person with any sense of accuracy a badly laid out vineyard is an eyesore.

The chain, or strictly speaking, wire method is to be preferred over all others for accurate results. The materials required are two lengths of No. 10 or 12 galvanised wire, a dozen sight pegs 4 feet 6 inches in length, two 2½ inch diameter iron rings, and two 3 feet x 1½ inch pointed iron or steel bars.

The planting wires are made by threading on to them small discs punched out from pieces of tin, and lightly straining the wires on a flat surface. The discs are soldered on to the wires at the distance apart one wishes to plant the vines. A suitable spacing in the vineyard is 8 feet x 11 feet, and to this end discs should be soldered on one wire at 8 feet apart and on the other wire every 11 feet. The iron rings are tied to the ends of the wires, and the iron bars (for holding the wires in position and for tightening them), are driven through the rings into the ground. White paper wrapped around the tops of sight pegs will prove an assistance in sighting.

The first step is to decide upon the width of the headlands, and where it is intended to plant a considerable area warranting the use of a large team, headlands should be left at least 25 feet wide. With small areas, say 10 to

20 acres, where only a small team will be necessary, a headland 20 feet wide will be sufficient. Then sight the base lines, using the sight pegs referred to, marking out one line at right angles to the other. This is easily done in paddocks that have been fenced on the square by simply taking the base lines off parallel with the fences.

In sighting, erect the sight pegs at a distance apart a little short of the length of the wire, so that the wire may be placed flush up against the sight peg. Straighten the wire, slightly strain it with the iron peg, and then drive the peg into the ground. Drive a vine stake into the ground at every soldered disc and continue chaining and staking until the base lines are complete. The area now squared off can be easily divided up and pegged out in blocks until the whole area is finished. If at any subsequent date it is desired to extend the area it can be done by continuing the base lines. In dealing with paddocks other than those having fences at right angles, set out first the greatest possible rectangular figure, and fill in the angle ends by means of the use of the sighting pegs and planting wire or tape.

Planting.

Before planting out the young vines, prune them to a spur of two buds, and cut off all roots along the stem with the exception of the bottom ones, which should be cut back to a length of about three inches. The rootlings can be conveniently carried by the planter in a bucket made from a kerosene tin, quarter-filled with water to keep the rootlings from drying out. A long-handled shovel is an excellent tool for planting with. The hole for the planting is made alongside of the stake, and a little surface soil is placed in the bottom of it. The vine is now placed in the hole as close as possible to the stake, and so that the union of the graft is just above the ground level.

In filling-in, heel the soil well around the roots and mound over in case of grafted rootlings, so that the earth comes to just above the top of the spur. This mound protects the graft and should be removed after the vine has satisfactorily struck. Remove any scion roots that appear, and throughout the growing season disbud any American wood that may grow. At the following season's pruning in nearly every case it will be necessary to reduce the wood of the vine to one spur of two buds again. Only in exceptionally strong vines should the stem be formed.

It is advisable to have a stake at every small vine, not only for the protection it affords, but also to guide the teamster when cultivating, especially if the soil is covered with weeds that are likely to hide the young growth.

THE first attacks of thrips on roses can be considerably checked by spraying with tobacco and soap mixture. It has also been found that when they are attacking the open roses, by going round with a bucket containing kerosene and water, and pinching off all open blooms that are swarming with thrips and dropping them into the bucket, the pest can be very much reduced, and the later roses very much freed from them. The thrips feed upon the pollen and the base of the petals, and thus cause the flowers to fall to pieces before they come into full bloom.—W. W. FROGGATT, Government Entomologist.

Poultry Notes.

September.

JAMES HADLINGTON, Poultry Expert.

In all but the very coldest districts of the State the close of this month should bring with it the close of the hatching season, and the "experience-wise" poultry-farmer will see to it that no eggs are set after the first week in this month. The why and wherefore of closing the hatching season at this point has many times been stated in these notes.

The Season's Hatching.

The results of this season's hatching appear, with few exceptions, to have been most satisfactory on the whole, fair to high percentages of chickens having been the rule. Unfortunately, the same cannot be said of the laying results, which have probably been the worst experienced during the winter months for many years. This, too, has followed upon generally poor average results from pullets during the autumn. These factors, together with the high cost of feeding that has prevailed for a long period, has had a most depressing effect upon the industry. Fortunately, however, poultry foods are now commencing to come down somewhat in price, and should this tendency continue, and foodstuffs reach something like a normal level, and should the prospects of an export trade improve at the same time, a big impetus will be given to poultry-farming.

The Growing Chickens.

It should be obvious, but it is worth stating as a reminder, that the months we are now in are the period during which the poultry-farmer can make or mar the prospects of his farm for next year. His egg-yield then will be very largely determined by the development secured in the chickens being raised now.

Allowing that a known profitable breed has been taken up, there are two main factors upon which we are absolutely dependent for success in egg-production. These are good breeding and good development. Without the latter the former fails to find expression in results.

Let it not be thought that the factor of development is unduly stressed in these notes. My observations over a wide field of activities in poultry-keeping leads me to the conviction that lack of proper development is the worst feature in the poultry industry, and it is safe to say it is the cause of most of the failures that occur in poultry-farming. My estimate is that a 25 per cent. all-round increase in egg-production would follow better development in the growing stock on many farms. The apparent difficulty is that many who go into business as poultry-farmers take years to learn to differentiate between good and bad development, yet this knowledge is absolutely necessary to success.

The question that every poultry-farmer should repeatedly ask himself during the rearing season is, "Are my chickens making the growth they should be doing?" and if the answer is not satisfactory the cause should be investigated with a view to securing an improvement. The cause of non-success in this respect will most likely be found in faulty brooding or unskilful feeding.

As a guide in this matter, it might be stated that unless 6½ oz. weight has been secured at four weeks old, and 14 oz. in pullets, and 16 to 22 oz. according to breed in cockerels at eight weeks old, the development is not quite what can be classed as good. As a matter of experience, any lack of growth during these early stages is rarely, if ever, made up later on, and the chicken is handicapped throughout its life.

The Main Factors.

The main factors in securing good growth are (1) heredity, (2) brooding, (3) feeding.

In regard to the first, we must have good breeding stock, which has been properly grown to standard size. Secondly, good brooding is absolutely essential to secure proper growth. Thirdly, in feeding it is not only necessary that good food be fed, but that it be skilfully fed. The main point is so to feed the chickens that they will eat the maximum amount of food, but, contrary to what many appear to think, keeping food always before chickens is not the way to induce the keenness of appetite that is necessary to the consumption and assimilation of the largest amount of food.

The farmer who secures the best development in his growing stock is not necessarily the one who is always endeavouring to follow all the latest so-called scientific treatises on feeding, or who feeds on highly concentrated food. As a matter of fact, a too narrow ration might induce early maturity, but not necessarily the desired growth. Maturity should not be confused with growth. For instance, we might have a mature bird very much lacking in the desired development, and it is this feature that is at the root of much of the degeneracy so much in evidence, and one of the main causes of smallness of egg, about which so much concern is being manifested at the present time.

The farmer who feeds on simple fare, such as advocated by the Department in "Rearing and Feeding," who exercises sound judgment, and is not afraid of the small amount of labour necessary to mix an appetising mash two or three times a day, is the one who, other things being equal, obtains the best results from his feeding, both in regard to cost and results.

Reminders for Brooding.

The main considerations in rearing chickens might be summed up as under:—

1. Heated brooders should be kept well up to the temperatures so often advised in these notes and in the publication already referred to. Underheating will lead to trouble, because it results in the chickens packing together. Start the chickens at a temperature of 90 to 95 degrees, and reduce it by about 3 to 4 degrees per week.

2. Good ventilation is absolutely necessary, and this can only be secured when the heater is capable of supplying the necessary radiation to allow of the admission of pure air.

3. A moist area on the floor of the brooder is an indication that chickens have packed together during the night. Deficiency of warmth is the cause. Chills and their after-effects are the results.

4. An unpleasant smell when the brooders are opened up in the morning is often the forerunner of trouble, and is an indication that better ventilation is necessary.

5. Chickens of different ages should be kept separate. Even a week's disparity in ages will be sufficient to stunt the growth of the younger ones. Successful rearing cannot be expected with mixed ages, and particularly so with those under six weeks old.

6. When chickens are seen with bare heads, and are feathering badly, it is generally an indication that they are crowding at night.

7. When chickens droop their wings and are less keen for their food, it is a sure sign that something has gone wrong. It may be due to a chill or actual disease. The first is generally the forerunner of the second, because the vitality of the chicken has been lowered by a condition which leaves it vulnerable to the disease germs that are always more or less present.

8. A sharp look-out should be kept for suck louse on the heads of the chickens. These are a very common cause of trouble. On the first sign of droopiness the chickens should be examined, and if this parasite is found the slightest touch of olive oil (nothing stronger is necessary) will kill the parasite; repeat it in eight days' time. Disinfecting brooders is no use for this trouble. Every chicken must be handled and treated.

9. Toe-picking is one of the most troublesome happenings in rearing chickens. This trouble can be avoided by a moderate use of common salt in the wet mash with which the chickens are fed for the greater part of the day. The right quantity to use is 1 oz. to each 5 lb. of mash. The salt must be thoroughly dissolved in the liquid with which the mesh is mixed, and there is no danger of salt-poisoning if this is done. If milk can be used for mixing the mash it will be so much more effective.

10. Thin out and weed out the chickens as they grow. Congestion in the brooder means poor development and risk of disease.

11. Over-hatching is responsible for many failures.

12. Keep the chickens growing from the shell without a check. This can be done by close attention to the details enumerated above, and profitable stock will be the result.

The Free Issue of the *Agricultural Gazette.*

Recipients of the *Agricultural Gazette* are reminded that if they wish a continuance of the free issue, they must fill in and return without further delay, the slips lately posted to them.

Orchard Notes.

SEPTEMBER.

W. J. ALLEN and S. A. HOGG.

WHERE ploughing is not completed, it should be finished with as little delay as possible, and the cultivator should be continuously kept going throughout the growing period of the trees and vines, so as to retain the winter rains and assure sufficient moisture for the development of the fruit.

During this month most fruit trees will be blossoming, and in some cases in the early districts they will have finished blossoming. In the case of apples and pears, strict attention must be given to spraying, the applications of arsenate of lead for the control of codlin moth being given when the petals have dropped from the fruit. This "calyx spray" is a most important one, and should be thoroughly carried out. The operator should not aim at economy, but should give the trees an excess of spray rather than an insufficiency.

Where black spot and scab in apples have made their appearance, lime-sulphur or Bordeaux mixture may be combined with the arsenical spray and applied at the same time. In some districts it has been found that Bordeaux mixture may have a russetting effect upon fruit, while in other districts it has not this effect. Lime-sulphur has been found to give uniform satisfaction, but in any case where lime-sulphur fails, then Bordeaux mixture should be given a trial, say, on a few trees, so that its effectiveness may be determined.

During this month scale insects, such as San Jose, may become active on such trees as peaches, plums, and perhaps apples and pears. With peaches and plums, lime-sulphur at winter strength may have a defoliating effect upon the trees; yet unless used at that strength it will not kill the scale. It would be better, therefore, to spray with a resin, soda, and soap wash.

If the trees are not vigorous and robust, it would be better to leave the spraying until after the fruit has been removed.

Woolly aphis on apples and pears may be kept in check by the application of nicotine preparations during either summer or winter, but care should be taken to carry out accurately the instructions given on each package.

Dusting.

The Department has received frequent inquiries as to whether dusting is more effective or has any advantage over spraying. From information received, principally from America (where in some districts this method has been given extensive trials), it has not proved generally satisfactory, as the same trouble arises in dusting as in spraying, only in a greater degree—that is, the weather conditions are generally unsuited for dusting because of winds. Dusting has not become a popular method of combating pests, whereas spraying has given more uniformly successful results.

Agricultural Bureau of New South Wales.

REPORTS AND NOTICES FROM BRANCHES.

NOTE.—While gladly publishing in these columns the views of members of the various Branches of the Agricultural Bureau, the Department does not necessarily endorse the opinions expressed.

Auburn.

Mr. L. S. Rumble, of Lidcombe, attended the July meeting of this branch and gave valuable information on the cottage-garden, particularly the vegetable portion.

Bullahdelah.

A branch of the Bureau has been formed at this centre with the following office-bearers:—Chairman, Dr. Kersteven; Vice-chairman, Mr. A. H. H. Ireland; Treasurer, Mr. J. Richards; Hon. Secretary, Mr. J. B. Watson.

Cardiff.

The monthly meeting was held on 16th July, when it was decided to purchase a 5-lb. keg of arsenate of lead for distribution among members at cost price. A useful discussion on co-operation followed, and delegates were appointed to attend the meeting of representatives of branches of the Bureau in the district.

Coonabarabran.

At a meeting on 2nd July formal business was transacted, and requests were made to the Department for various experts to visit the district and deliver lectures. It was decided to ask the Railway Commissioners to allow a pass for an attendant accompanying one truck of stock, as is at present done with three trucks from one owner.

Coradgery.

The members of this branch met on 6th July, and arranged a programme for the visit of the Select Committee on Agriculture. It was agreed to act in conjunction with other farmers in preparing evidence for the Committee.

A seed-wheat competition is to be held by this branch, and a proposal to start a sports club (including the possible construction of three tennis courts) is also receiving attention. A picnic luncheon is also to be held shortly.

Cotta Walla.

A pruning demonstration was given by Mr. S. A. Hogg, Assistant Fruit Expert, at Mr. J. Kadwell's orchard on 8th July, a number of varieties of apples and pears being dealt with, and members unanimously testifying to the value of the advice given.

At a meeting on 25th July, Mr. J. E. O'Neill gave an address on the care of cream, advocating cleanliness with all utensils at all stages, describing the cooling of various batches, and touching also on mixing, stirring, and ripening. Mr. O'Neill also offered to give instruction in the use of the Babcock tester to anyone who wished it. It would be quite sufficient for two neighbours to purchase one tester between them, and to use it in alternate weeks.

Cunningar.

At a meeting on 22nd July, Mr. B. J. Hocks gave a lecture on noxious weeds. He urged farmers to act promptly in relation to such pests, and thus save heavy labour in subsequent seasons.

Dapto.

On 7th July, Mr. C. O. Hamblin, Assistant Biologist, lectured on red stain in sorghum and other fungus diseases.

Some Fungus Diseases of Plants.

Mr. Hamblin said red stain was a fungus disease which could be conveyed in the seed, through the soil, or by the air. All were familiar with the manner in which affected canes turned red. Eventually the value of such crops was much impaired. Sorghums, millet, and Sudan grass were all more or less affected. Clean seed of a broom millet was obtained from Kew Gardens, London, and clean seed of eight varieties of sorghum was imported from America, but when planted on Mr. F. James' farm in the district all except one variety had come up diseased. That one variety gave some prospects of resisting the disease. Plants from diseased seed were checked in growth and never attained the vigour and feeding value they should have. The bulk of the sorghum land in New South Wales was now affected with the disease. The only remedy was the selection of resistant varieties, and if healthy plants were found in a badly-infested patch the seed of those healthy plants should be carefully kept, and by continuous selection on those lines a useful and resistant strain should result. Saccaline and some of the Department's selections from Planter's Friend were most resistant at present to red stain.

Proceeding to deal with other plant diseases, Mr. Hamblin remarked that head smut affected both sorghum and maize, and neither should follow the other on land liable to produce smutted crops.

An example of leaf stripe was to be seen on Mr. James' farm, Amber Cane and Saccaline being side by side, the first badly affected with leaf stripe, and the second quite green. This was new land, formerly an old cattle camp.

Mr. J. Stevenson asked if the spores of red stain would still be capable of germination after passing through animals, but was informed that this was still doubtful, though it was not very important, as the disease was air-borne.

Mr. L. McPhail stated that a crop of his was badly diseased, while a crop grown by Mr. R. C. Johnson from the same seed was practically free. He also mentioned that a crop grown on new land was badly affected, while a crop on land continuously cultivated for thirty years was practically clean. The soils were different.

Mr. Gibson asked if late crops were less affected than early ones, and Mr. Hamblin answered that the temperatures might have something to do with such an apparent tendency. On the South Coast the late crops matured in the winter. On the North Coast broom millet was being very seriously affected by red stain.

In reply to a question why a plot where the timber had been burned off was badly infected, Mr. Hamblin said it was possibly due to an excess of potash or some other adverse condition in the soil.

The lecture was illustrated with lantern slides, specimens and photographs, and was evidently appreciated.

A very successful social evening was spent on 18th July, each member bringing a friend. About 100 people were present, and an enjoyable time was spent.

Freeman's Reach.

Mr. W. H. Spinks, Fruit Inspector, visited this branch on 15th July, and gave a lecture on citrus culture. The suitable districts, aspect, preparation and planting of the land, and the care of the trees while young and when in bearing were all dealt with. Several members took advantage of the opportunity to ask questions, and obtained valuable information in that way.

Garra-Pinecliff.

On 23rd June Mr. W. le Gay Brereton gave a grading and packing demonstration at Mr. S. W. Packham's, and in the course of it gave much useful information.

Glenfield.

Mr. P. McDonald read a paper at a meeting on 21st June, of which the following is a report:—

Improvement of Rural Social Conditions.

Mr. McDonald pointed out the influence of the school teacher in a district, and urged that parents should pull together with the school teacher. A visit to the school in the right spirit encouraged the teacher and pupils. Parents' support was also needed to obtain proper equipment, improved surroundings, and the like, for the school. The school grounds should resemble, as near as possible, a botanic garden, containing an agricultural as well as a horticultural section. The school building should be an attractive one, with plenty of light and ventilation. If the adjacent country contained many small towns and the roads were good, it would be advisable to build one large school, for fewer teachers would then be necessary than with a number of smaller schools, and the upkeep would be comparatively less. Such a school would need as part of its equipment a number of motor buses to convey the children to and from school. While school was in, these buses could be hired or used to convey fruit, eggs, butter, &c., for a co-operative society, which could be run in conjunction with the community school.

The education in a large school would be of a higher standard, and the combined efforts of teachers and pupils would show better results than the over-worked teacher of a one-man school. By building a large school, the basement or lower floor could be used as a community hall, available for pictures, school concerts, lectures, public meetings, and last but not least, public worship. The latter would not then be the problem it was to-day, as the community spirit would take hold of all denominations, making them more neighbourly and brotherly, seeing eye to eye with one another.

The chief problem confronting the farmer was to hold his children on the farm, and here again the community could assist by bringing the choicest of city amusements to the country. Another good move in the same direction would be the introduction of calf, pig, and poultry clubs, &c., the objects of which would be to try to interest the children in the rearing of farm animals and poultry. He suggested that a certain number of interested people should create a fund for the purchase of pure-bred stock, to be handed to boys desirous of rearing animals, together with directions for the care and handling of that class of animal. If this were done with pigs, for instance, one each could be handed to several boys, and on the expiration of, say, six months, the pigs be again brought together for the purpose of being judged, and a prize could be given to the owner of the best animal. The pigs would then be sold, the proceeds going towards refunding the purchase money and each lad receiving portion of the remainder, according to the price obtained for his pig. Or a heifer calf could be allotted to each boy, or perhaps girl, with the object of it being reared for competition. The calves could be sold, or perhaps a child could purchase his particular calf with the object of founding a herd. He or she would naturally have a greater desire for cattle rearing after being a prize winner in a competition. Similar methods could be used with regard to poultry.

Two prime needs in most country districts were (1) a co-operative marketing and purchasing organisation, and (2) a rural bank, to help the farmer (especially the small man) more thoroughly to utilise his opportunities, to enable him to obtain labour-saving appliances for the farm and home, and to enable him to brighten the home so as to make it look more home-like than many farm houses of to-day.

What Australia required was farmers' homes owned by folk who loved farm life for its own sake, who were intelligent and progressive, and who were earning enough off the farm to enable them to live with some of the comforts of life.

Mr. McDonald closed by suggesting moving pictures as a means of improving social conditions in the country. A community movie could be a community information parlour. There, weekly, could be learned health, sanitation, civics, world events, modern inventions, home and farm improvements, science, and household art. The

opportunities for instruction were very numerous indeed. Useful lessons could be set forth with it more graphically than could be done in any book. Public-owned picture outfits would bring interest and entertainment to once jaded folks, and save time, trouble, and expense in preparing local concerts.

Glenorie.

The annual meeting was held on 1st August, when the balance-sheet and report showed that the year had been one of progress. The following office-bearers were elected :—Chairman, Mr. F. A. Nicolson; Vice-chairmen, Messrs. H. Walker and E. King; Hon. Secretary, Mr. G. W. Hitchcock.

Arrangements were made for the staging of an exhibit of fruit at the Royal Society's rooms in Sydney in connection with the Sydney (Metropolitan) branch, after which the fruit should be sent, at the growers' wishes, to the hospitals. The Glenorie growers were very proud of this display, and themselves hired two motor-lorries to take it to the city.

Hannamvale (*vid* John's River).

This branch held a meeting on 15th June, when Mr. C. C. Crane, Organising Inspector, was present and delivered an instructive lecture on co-operation.

Kentucky.

A branch has been formed at this centre, particularly in connection with the Returned Soldiers' Settlement. At a meeting held at Mr. Fulthorpe's house on 20th July, it was agreed to hold meetings monthly in the school-room. It was agreed to ask that a veterinary officer visit the settlement as soon as possible, and that application be made for visits by other Departmental officers.

Kunama (Batlow).

At a meeting on 19th May, a lecture was given by Mr. R. J. Scifleet, Manager of the Settlement, his subject being methods of pruning and care of fruit trees. The information conveyed on many points was practical and valuable.

On 20th July, Mr. S. A. Hogg, Assistant Fruit Expert, attended this branch and gave an address on fruit-growing that was appreciated. The same evening Mr. C. C. Crane, Organising Inspector, was present and gave a lecture on co-operation. He was pleased to find that the branch had a co-operative of its own.

Lower Portland.

The annual meeting of this branch was held on 4th August, when the office-bearers elected were :—Chairman, Mr. Bruce King; Vice-chairman, Mr. J. Blundell; Treasurer, Mr. R. J. Metherell; Hon. Secretary, Mr. H. Hayward.

The treasurer's statement showed that the income had been £190 3s. 6d., and the credit balance in hand was £9 3s. 1d. Included in the disbursements were the sums of £80 13s. 9d. to Windsor District Hospital (the result of a special effort), and £44 as prize money for the show (as compared with £23 19s. for the previous show). The membership remained very satisfactory.

Malebo.

A lantern lecture was given by Mr. Pedersen, Dairy Instructor, on dairying subjects on 20th July, and drew a good gathering.

March.

Mr. N. Griffith read the following paper at a meeting on 18th May .—

Co-operation.

It is a recognised fact that co-operation must arise from necessity if a successful association is to be formed. It is also essential that members should be well acquainted with each other, and that they should be interested in the purchase and distribution of similar products. Much organised work is necessary to prepare the way for co-operation in this district, but the rural workers' claims and the organisation of other trades and occupations is making it necessary. All along the line the primary producers seem to be up against some organisation or other. The domination of capital in the past, and the unreasonableness of organised labour in the present are two extremes, and must result in revolution if continued.

Loyalty is the keynote of success in co-operation. In a certain town one of the leading tradesmen remarked that it would be £1,000 well spent to crush a small co-operative society that had started there—and it was crushed, the members of the society eventually paying the £1,000 to crush their own business.

It is advisable that co-operative purchasing should come prior to co-operation in the marketing of products. In co-operation each member is responsible for the success or failure of the movement, and each member should realise the responsibility of his part. Primary producers often shirk this responsibility; they take no interest in the movement, are willing to let their neighbours shoulder all their responsibility, sell and buy wherever they can, and only patronise the co-operative association when they cannot procure to better advantage elsewhere.

Most producers seem afraid to put down a £5 or £10 to form an association, as they think there is a chance of losing their money. They seem to prefer a straight-out loss on the purchase of some piece of machinery.

I would advise the formation of a co-operative society on a pecuniary profit system, as members would be more likely to support it when there is some visible return for their expenditure, and it would tend to increase the membership when non-members learn of the dividends received by neighbours. It is my opinion that the Government should assist producers' co-operative societies in the way of finance, legal advice, grants of land to build store-rooms, silos, &c.

Here are a few instances why it is necessary to form a co-operative society here. Local producers were getting 1s. 9d. per lb. for butter when the same butter, bought over the counter, was costing 2s. 8d. per lb. Hides have come down in price, but boots have not. Prime mutton can be bought at the yards to-day at 3½d. per lb., but it costs 9d. over the counter. Wheat has fallen in price, but bread has not. The same applies to wool and clothing. On numerous occasions the orchardist has received considerably below the cost of production for his fruit.

I will briefly quote a few of the things that could be done here by co-operation. The purchasing of fruit-cases could be done more economically than at present, and also the purchasing of wrapping and lining paper by indenting our own. In a recent publication of the *Agricultural Gazette* it was stated that a co-operative sheep-dip had been run successfully; why should not the graziers of this district organise and do likewise at a big saving? I also favour the Women's Institute co-operative movement. As a side-line a co-operative society could deal with pests, such as parrots, rabbits, hares, &c., to good advantage, and the codlin moth could, no doubt, be reduced, if not eliminated, by a co-operative campaign against it. The formation of a packing shed, evaporator, and pulping plant is a most necessary thing to this district. The orchardist could then leave grading, packing, evaporating, pulping, and marketing in the hands of persons more competent to deal with them than himself, and could concentrate his attention on growing the fruit. The co-operative packing-shed would do away with all the trouble of packing, stowing, cool storage, &c. Co-operative carting of fruit to the market or packing-sheds could be done to advantage.

In the event of the society adopting the packing-house scheme, it would be essential to have the subscriptions based on the productive acreage of the members, and the returns to be based on the actual sales effected. The expenses would have to be based on the quantity of fruit marketed, as a poor grade of fruit generally costs more to market than a good class, especially in the evaporating and pulping line. The orchardist spends money, time, and skill to get his fruit to the Sydney markets, then hands them

over to a system of exchange that is not satisfactory, as it is open to abuse. If the producer had a voice in the selling of his fruit, he would hold the key in his own hand, and if it could not be sold in the local markets at a fair price, it could be exported.

Co-operation would be a good investment for the poultrymen of this district. Each shareholder could have a small rubber stamp, numbered, and could stamp all his eggs with it and guarantee them fresh. All eggs could be gathered once a day; a carter could test all eggs for freshness, collect them at least twice per week, and consign them to market. In the event of a supplier putting in stale eggs, he should be liableto a fine.

The annual meeting of this branch was held on 20th July, when the balance-sheet showed a small credit after a useful year's operations. The office-bearers elected were :—Chairman, Mr. N. Griffith; Vice-chairmen, Messrs. J. Casey and H. S. Griffith; Hon. Secretary and Treasurer, Mr. R. Parker.

Matcham.

On 18th June papers were read by Mr. A. Macinante on manures and their uses, and by Mr. S. C. Aldridge on nitrification. A summary of the former is held over.

Nitrification.

If we allow soil to remain sodden with water to the exclusion of air the nitrifying bacteria will diminish, and conditions will not be favourable for nitrification, so that we may here notice one reason for tilling the soil that we do not often think about. We must also consider the question of drainage, for the organisms require air to favour their work, and drains help greatly to aerate the soil. Also we must have an absence of sunlight, for the sun's rays kill the bacteria that convert the nitrogen in humus into nitric acid suitable for healthy plant life. Yet we must have a suitable heat for the bacteria to work in, as they cease to work before the temperature reaches freezing point. Again we must have a percentage of lime in the soil, for lime favours nitrification by killing bacteria that would prevent it, and also by assisting the process of oxidation of the humus, without which we cannot get suitable plant food.

Any of the leguminous plants such as peas, beans, lupins or clovers, are of great assistance in nitrification as they are able to absorb nitrogen from the atmosphere, and through the nodules that grow on their roots produce bacteria that assists greatly in nitrification. We grow peas around our citrus and other fruit-trees for the purpose of enriching the soil in nitrogen, and that is probably our cheapest way of obtaining nitrogen, though if we would obtain the highest results we should grow them in the summer instead of winter. Dried blood is one favourite way of applying nitrogen, but it has the disadvantage of not being quickly available, and I fear we apply a lot of dried blood to crops uselessly, owing to the blood having to decompose before the nitrogen can be assimilated by the plant.

Miranda.

At the annual meeting, on 11th July, the following were elected for the ensuing year :—Chairman, Mr. E. Thacker; Vice-chairmen, Mrs. Paton, Messrs. E. W. Phillips and R. M. Russell; Treasurer, Mr. J. W. Macfarlane; Librarian, Mr. W. J. Buckland; Hon. Secretary, Mr. A. Wigzell; Assistant Secretary, Mrs. R. M. Russell. The report showed that during the year several instructive lectures had been given, and the balance-sheet showed an excess of assets over liabilities of £83 8s. 3d. There were 125 members.

During the year a poultry competition has been held, eight competing for the trophy presented by Mr. Ley, M.L.A. First place was won by Mr. B. Stower, and second by Mr. Liebrand. Mr. J. England acted as judge.

A meeting was held on 25th July, when a number of pertinent questions from the question-box provoked interesting discussions. It was considered both possible and profitable to prevent Irish blight in a potato crop by spraying.

Moss Vale.

On 20th June, under the auspices of the Moss Vale branch, Mr. H. A. Mills, Fruit Inspector, gave a very interesting pruning demonstration.

Mr. Mills clearly showed the benefit to be derived from single leader pruning, by the breaking out of new wood and fruit spurs all along the limb of the tree so treated. This method is especially recommended in the case of old trees. This was the second demonstration at Moss Vale by Mr. Mills, and it is hoped that next year he will be able to come along and point to the results of the work done.

At night Mr. Mills gave a lecture, at which a large number of members were present. He showed the correct method of preparing the ground for setting out young trees, and explained how they should be pruned until the early fruiting stage. A fine sample of the latest apple of a very late and good-keeping variety called Tasman was shown. Names and descriptions of different diseases attacking fruit-trees were given, and grafting and spring budding explained.

Mr. Mills offered to give any one interested wood for budding, and any information, if they would write to him.

The branch is taking an interest in the proposed survey for a railway from the main southern railway to the South Coast.

Narooma.

A branch of the Bureau has been formed at this centre, with the following office-bearers :—Chairman, Mr. J. McMillan; Vice-chairman, Mr. W. T. Moorehead; Hon. Secretary and Treasurer, Mr. A. H. Costin. Membership has reached thirty-two.

The branch is seeking information with a view to the purchase of a stud bull for the benefit of members.

At a meeting in July, discussion took place on the most suitable maize for the district, nearly all favouring Hickory King, and it was agreed to inquire for 16 bushels of seed for distribution among members. Of potatoes the varieties most favoured were Beauty of Hebron, Up-to-date, Satisfaction, and Brownell's Beauty, and seed is also being inquired for of these varieties for the benefit of members.

Pambula.

The question of co-operative buying was freely discussed at a meeting on 21st June, and it was decided to hold an " order meeting " at an early date to take orders and send them, through the secretary, to the firms quoting cheapest.

It was decided to purchase a Jersey bull for use in members' herds, it being recognised that a good animal, sired by high producing parents, would benefit considerably the herds of the district.

Craig Mitchell, a variety of maize new to the district, was mentioned by two growers, and the superiority of Saccaline over other sorghums was also pointed out.

Rydal.

Mr. A. Lemon's paper, read at a meeting on 20th June, was as follows :—

Pasture Grasses suitable to the District.

Of our pastures on the whole, it may be said that they are poor, especially in winter. To overcome this it is necessary to resort to artificial grasses, and in doing so we want to select a grass or grasses which will resist severe frost. I give *Phalaris bulbosa* first place, as I consider it by far the best cold-climate grass. I have not given it a very extensive trial, but sufficient to prove that it is practically frost-resisting, and admirably suited to our district. *Phalaris* needs a fairly rich soil to come to perfection, and being

a deep rooter it is a good drought resister; in fact, on one experiment farm its roots have been known to extend to a depth of 6 feet. Drill sowing generally seems to be favoured on the experiment farms, the drills being about 2 feet 6 inches apart, so as to enable cultivation to be carried out; seeding at the rate of about 8 lb. to the acre. I have only sown broadcast, but this requires more seed. Sowing in autumn is best, as the young plants get a good root before the following summer. It is also a good plan to sow a light crop of, say, oats at the same time as the grass, as this affords a shelter for the young plants for the first winter. Only a light crop should be sown, however, as a heavy crop would take too much nourishment from the grass.

I give next place to cocksfoot, which I have found to thrive very well in our district and to be greatly relished by all stock, but it will not withstand severe frost as well as *Phalaris*; it does not require such rich soil as *Phalaris*, but seems to thrive on almost any poor land, and is a good drought resister. As it is a grass which is inclined to grow tussocky, it is considered a good plan to sow the seed thickly at the rate of about 40 lb. to 50 lb. to the acre, sowing in the autumn.

Perennial rye is another good grass, but does not seem to stand drought conditions as well as the two first mentioned. It seems to thrive on almost any of our reasonably good soils, but seems to prefer a clay loam. Sandy soils are not suited to it. It is considered best to sow it with a mixture of either clover or cocksfoot (20 lb. rye, 10 lb. clover), or 20 lb. rye with 10 lb. cocksfoot and 5 lb. clover.

It is not advisable to stock any of the grasses heavily for the first twelve months—only sufficient to keep them from running to seed.

Departmental Note.—The Agrostologist remarks that the grasses mentioned are suitable for the district. *Phalaris bulbosa* could be sown through every drill, and on a properly prepared seed-bed cultivation is not required. We find that Bokhara clover grows well with *Phalaris* and also with cocksfoot. Sheep's Burnet is recommended for poor soils in cold districts. It can be mixed with the ordinary pasture mixture—cocksfoot, rye, and prairie. The Department is now developing a superior strain of the latter, which promises to be perennial in habit. The most important native winter grass for this district has been omitted by the lecturer, namely, *Danthonia semiannularis*, sometimes called wallaby, white top or fluffy top. This grass will grow on poor as well as good soils, and is highly recommended.

Sydney (Metropolitan).

A demonstration of the pruning of roses and other plants was given in the Botanic Gardens on 15th July, a number of the officers there acting as pruners and demonstrators. Mr. E. N. Ward, Superintendent, said the chief requirement in rose growing was to produce good healthy wood by cultivation; then, when it had flowered and was becoming weak and worn out, to cut it away and make room for new flowering wood, which burst from ripe and plump buds to be found on one-third of the wood of hybrid perpetuals, one-half of hybrid teas, and two-thirds of teas. In other words, for flowering purposes, hybrid perpetuals could be cut back to a third, hybrid teas to half, and tea roses to two-thirds.

The presence of the delegates to the Interstate Conference of fruit-growers was availed of by the Metropolitan branch for an informal but very interesting discussion on many matters connected with fruit-growing on 5th August. Mr. W. le Gay Brereton, Assistant Fruit Expert, gave some information on the various diagonal and numerical packs; Mr. J. Donaldson (South Australia) related the wonderful growth of co-operation among the fruit-growers of his State. Accounts were also given by other visitors of the development of co-operation and cool storage in their own States. Exhibits were staged by the Biological, Entomological, and Chemist's branches of the Department, showing the extent of their activities.

On 13th August a party of gentlemen representing grazing and dairying interests visited the Veterinary School of Sydney University, and was conducted by Professor Douglas Stewart through the laboratories and lecture rooms. A brief account of the teaching methods of the school was given. The operating theatre was found most completely equipped, and the chamber arranged for demonstrations to the students was much admired.

Tennyson-Kurrajong.

The following is the paper read by Mr. W. S. Arnold on 6th June :—

Passion Fruit.

There are quite a number of varieties of edible passion fruit, such as Mexican, Banana, Grenadilla, and others, but the one we here are most interested in is the common purple-fruited one known as *Passiflora edulis*. It is a native of Southern Brazil, and has fruit about the size of a hen egg. The Kurrajong district seems to be peculiarly adapted for the growth of passions, and they can be grown on any site or soil that we can grow our winter peas on, that being a large area. I have seen passions grow luxuriantly in sandy soils, loamy soils, and on heavy loams. The best site for the passions is undoubtedly the well-drained, sloping, north-east aspect, protected by a break-wind on the west and south. I have grown passions around a hill that faced all points of the compass, and learned a good many lessons therefrom in the training of the vine. Some trellis passions between their young fruit trees. The returns will more than pay for the upkeep of the young orchard when handled rightly. Personally I prefer to grow the vines by themselves, as I have seen both trees and vines checked by adverse weather conditions at a critical time.

Great care must be taken that the seed is from vines free from woodiness. At present many growers are obtaining their seed from Norfolk Island and Queensland, as woodiness is not very much in evidence in those fruits. However, fine results are obtained if one is careful in getting seed from vigorous, clean vines in his own district, and my experience warrants such selection. As only about 300 plants are required to the acre for planting, with vines 12 feet apart and in trellises of the same distance, twelve good specimens would provide ample plants for that area. Seed can be thinly sown in a warm, open seed-bed in autumn to be ready for spring. The hardier the plant the better, as when put out it must be kept growing from the very beginning. Although spring is the time for planting, commercially passions can be planted during any of the spring, summer, and autumn months if the weather is moist enough.

Land newly cleared, but from which one season's crop (preferably peas) has been grown, makes an ideal area, as the ground becomes sweet and in good condition, with a fair amount of organic and nitrogenous matter, &c., in it. Before planting, the trellises should be erected, the posts being 20 feet apart and 5 feet out of the ground and 2 feet in the ground. The end posts of the trellis must be substantially stayed and rammed in, as there is a very great weight to support when the vines are full grown. No. 8 wire is threaded through holes made about 2 inches from the top of the post on the same level and about 6 inches apart. Black wire is cheaper, and does not burn the young vines the first year, as is sometimes the case with galvanised wire. I recommend two wires on top. Trellises running north and south seem most favoured, as the sun can shine on both sides of the vine; especially is this needed for winter passions. The trellis at the western end should be made higher than the others to act as a break-wind. Sticks about 6 feet long are set in the ground along the trellis, about 12 feet apart and fastened securely to one of the top wires with tie wire; this is imperative. If the stake is not rigid the young vine often gets broken through the stake being displaced. A little blood and bone manure worked around the stake will help the young plant wonderfully when planted. Closest attention must now be given to clean cultivation. The young vine must be trained with a single stem till the wires are reached. All side shoots must be carefully removed, but not the leaves, or you will have a sun-scalded plant, which means a check (possibly resulting in woodiness). Once the trellis is reached the vines can be trained both ways until the wires are covered. Vines will now be flowering and the very best quality of fruit will be found up to eighteen months and will sell in any market any month.

Pruning is essential after the second year, as it produces the best paying crops and prolongs the commercial life of the plant. If left unpruned the plant practically exhausts itself in four years, whereas by judicious pruning and manuring vines can be kept profitable for six or eight years. On our red soils they last longer than the lighter ones. The summer crop coming in about February seldom pays, as the market is well stocked, so we prune in November to within 4 inches of the trellis to miss this market, and to induce a new growth that will produce an early and payable winter crop. Some orchardists leave pruning until January and February, and secure a late winter and an early spring crop, which is perhaps as profitable as the late winter crop. If one has a large area it is wise to work for both these markets. Pruning and manuring at the same time, especially if followed by a good rainfall, will cause a strong growth, which is almost a preventive from woodiness.

Whilst on the subject of woodiness I might state that it was the only disease I had to combat. It is a bacterial disease, found mostly in vines past their zenith of growth. It appears when the development had been checked by carelessly ploughing too near the vines (thereby destroying root fibre), by want of manure at the right time, exposure to bleak, cold winds, a heavy frost, or any other condition that checks the growth.

In a series of experiments the Department of Agriculture found the best results were derived by an application of 5½ cwt. sulphate of ammonia, 3 cwt. superphosphate, 1½ cwt. sulphate of potash to the acre, or at the rate of about 4 lb. of manure to each vine.

The best method is to prong-hoe 2 feet on either side of the trellis in winter and chip with flat hoe in the warmer months. Between these worked strips cultivate with a spring-tooth or disc harrow in preference to the plough. Vines are best manured in spring and autumn. It is always well to stir the land after every application of manure and after every fall of rain. Cultivation conserves the moisture, mellows the soil, and keeps the plants growing.

In the hot summer months the passion should be picked every day, or at least every other day, to get the best returns in Sydney. For Melbourne and New Zealand one can pull on the green side, but they must be well coloured for any market. Grading is absolutely essential, not only in size but in colour and quality, not putting any crinkly or woody ones with smooth, firm ones of the same size. On no account top the cases. One's brand becomes quickly known in the market, and buyers will purchase readily once they know the grades are uniform. The figures following are for fifteen half-bushels sent in one consignment, and demonstrate the value of grading, and this was when passions were fairly cheap—5 specials sold, 2 at 12s., 3 at 11s. 10d., 5 A1 at 10s.; 5, 1 sold at 4s. 9d., 3 at 4s. 8d., 1 at 4s. 3d. On fair land you can average about 230 cases per acre per annum. After all expenses are deducted one can clear £40.

The Mexican, from what I can make out, is a large-fruited purple passion. The Pomological Society decided it was of little commercial value in comparison with our locally-grown one. Palmdale Estate orchard, near Gosford, some time ago put 100 half-cases of these on the market and realised £100. Within three months the same passion could hardly be sold.

The banana passion grows luxuriously in the warm coastal districts. It fruits well—is somewhat of the colour, shape, and size of the small banana, but being soft skinned will not stand packing too well. An agent in the markets told me he has a keen demand for them. He sells them readily in punnets of 12 for 1s. 6d. to 2s., and the demand is growing.

The Grenadilla is a large passion, not at all suited for our purposes.

One local grower showed me his account sales for last July, August, and September from passions, and the cheque from the agent was £227. Only last March he realised 18s. to 23s. per half-bushel. His vines are planted 15 feet apart. Each vine pulled four half-cases.

Another grower told me he obtained 24s. for a half-bushel of 15 dozen fruit, and cleared over £50 an acre.

A third, from a block of 3½ acres of 7 year-old vines, took 853 half-cases, realising from 3s. to 32s. each. Manure was used with blood and bone. In 1916, three years previous, that same block cleared £300.

Last year from 5¾ acres a fourth received a return of £500. He used manure and blood and bone, 3 lb. to the plant, in the furrows, which makes the roots go down and does not feed summer grass. He only used one wire on top, planting 10 feet apart, in rows. His posts are 24 to 30 feet apart, and he struts them when a load sags them down. When six years old he grubs them out. He estimates that he made £50 an acre per annum for the period.

Passions ship readily to New Zealand, and realise 30 per cent. higher prices than Sydney markets. I sent two cases to England by a friend, just to see if they would carry. So far the English people have not acquired the taste, and hence the demand is small, and the same can be said of America. The Department sent twelve boxes to the Trade Commissioner at 'Frisco, in order to test the demand for this fruit and to determine the best method of packing. Three styles of packing were adopted—wax wrappers, ordinary wrappers and cork dust. The fruit arrived in good order. Those in wax and ordinary paper were excellent, but those in cork were riper and more shrivelled.

Thyra–Bunaloo.

On 16th June, Mr. A. Thompson read a paper dealing with ploughing in relation to depth of soil and subsoil.

DEPTH OF PLOUGHING AS INFLUENCED BY DEPTH OF SOIL AND SUBSOIL.

The depth of ploughing depends largely on the kind of ground one is ploughing, for plain should not be ploughed as deep as timber land. Shallow ploughing is the easier to work, and in new ground for the first year it produces as good crops, if not better, than deeper ploughing; but if cropped two or three years in succession, it does not do as well as land that has been ploughed deeper.

When ploughed shallow, say 2½ inches, the land is easier to work and the crop will strike well; but it will not stand the hot winds of October and November as well as deep fallow. Again, it becomes dirty much more quickly and is subject to flag smut in the third year.

Deep ploughing, of course, is harder work, and takes more working to get it into a good seed-bed, and perhaps the crop will not be a very big yielder for the first year, but it will do well the second and third year in succession, and will not be nearly as subject to flag smut as shallow ploughing.

Plain land should be ploughed from 3 inches to 3½ inches deep, not worrying if a bit of subsoil is ploughed to the surface, as a little will not hurt, though too much is worse than shallow ploughing, because if much subsoil is brought to the surface the ground becomes sodden and sour, and if the land is ever left out to grass it grows only a stunted barley grass and not much of that.

Another reason for not bringing too much subsoil up is that once the top loam gets much subsoil worked into it, it will not soak up much water in a heavy rain, and therefore the water lies about in pools and kills everything that is sown on it. The depth plain should be ploughed, therefore, depends largely upon how near the surface the subsoil lies, and the ploughman should best be able to judge for himself the correct depth to plough. For timber ground, I think from 4 to 5 inches will be all right, and new land should be ploughed well the first time. Badly ploughed new ground is always bad to plough afterwards, because the poorly ploughed patches are always harder than the well ploughed ones. The best advice is, "When you fallow your land, plough it, not scratch the surface."

DISCUSSION.—Many members advocated ploughing plains not too deep.

Mr. ADAMS was of opinion that many did not plough the plains deep enough. He mentioned some land adjoining him that had been ploughed well into the subsoil, and that neighbour had grown, and was still growing, the best crops in that part.

On the other hand, Mr. MACKINTOSH advocated shallow ploughing on plains. In support of this, he mentioned a neighbour's land that had been broken up to a depth of 8 inches or so, and spoilt, growing very little herbage since.

Mr. J. SINCLAIR favoured June fallow, and Mr. T. TOMLINSON liked to have as much as possible turned over before the frosts.

DEPARTMENTAL NOTE.—The Chief Inspector of Agriculture remarks that while it has been possible to determine fairly accurately the depth and method of cultivation most suited to typical wheat soil, it has not yet been proved exactly what class of cultivation is most suited to the heavier types of soil. The black soils differ very much from the red soils, and further considerable differences exist between the types of black soil. Some are black and puggy, while others are loose and puffy. They vary, not only in different districts, but even on the same farm, and consequently much difference of opinion exists in regard to what class of cultivation should be given. The experience of the Department has been that it is not advisable to plough black soil more than 4 inches deep, but that it is important to plough thoroughly so that none of the ground is missed. Where the subsoil is close to the surface, care must be taken not to bring much up, and the depth must be regulated accordingly. Very often black soil becomes loose, and as such a condition is very detrimental to the growth of wheat, care must be taken to avoid having these soils loose when the seed is sown. It is found that the best practice is to plough thoroughly for fallowing and to prepare the soil for seeding by giving a shallow cultivation. If it is necessary to plough just before seeding the ploughing should only be shallow. In Victoria and South Australia the practice now largely adopted in dealing with this class of soil is to plough in March and to leave the land in a rough state through the winter.

Tilba.

A meeting was held on 13th July, when arrangements were advanced for a lecture on herd-testing by Mr. A. T. R. Brown, Dairy Instructor.

Toronto.

Mr. H. Filmer's paper, read at a meeting on 6th June, was as follows :—

Propagating Plants from Seed.

In raising seedlings a little forethought must be given, otherwise things may go wrong. One often hears, "I planted so-and-so, and did not get one up." The speakers do not say how they treated them. The common causes of seed failing to grow are planting in unsuitable soil, planting too deep, and planting in boxes that are allowed to get dry.

First we will deal with the position of the seed-bed. Different sorts of seed require different positions, meaning different amounts of shelter from the sun. The position required for hardy flower and vegetable seeds, such as snapdragon, phlox, stock, cabbage, lettuce, and onion, is one that is sheltered from all wind, but open to the sun. Do not select beds against fences, as they are too shady, and tend to make the plants too spindly and weak. Plenty of sunlight is what is required. We must see, too, that the drainage is good, otherwise, with excessive water, the ground will become sour, and thereby block the germination of the seed.

With the average garden soil, all that is required is plenty of well-rotted manure and the ground brought up to a fine tilth. If the ground is clayey, then some good sand is an advantage, and helps to stop the surface from becoming caked, which is one of the worst things that can happen to any seed-bed.

All seed should be planted in rows, not broadcast, as one can then be sure that the plants are going to get a fair amount of sunlight and will not be overcrowded. This is necessary to give short, stocky plants, not spindly ones, such as are often seen. The depth to cover seed goes by the size. Seed should be covered with fine manure or soil, equal to the thickness of the seed, fine seed not being covered at all, and large seed planted its own thickness in depth.

When planted, a good watering with a fine spray is needed so as to settle the earth around the seeds and start them off. Some shelter must be provided, a good plan being to stretch a piece of hessian over the bed; this tends to keep the earth more moist, and stops the sun from burning up the tiny young plants just as they appear above the earth. This protection can be left until they are up nicely, when it must be removed by degrees so as to harden them off gradually.

Seeds vary in the time they take to show through, from a few days to weeks. The bed should be kept moist, but not over wet. The after treatment of the plants varies according to how the seed was planted—if thickly, then they will have to be thinned out, and if thinly they will be all right, the idea being to give each plant enough room to grow.

Fine seed, such as coleus and cineraria, require different treatment from the hardier sorts, and are best planted under glass. The usual method is to get a shallow box or seed-pan, and two-thirds fill it with the best material possible; soak well with water before planting, then when it has drained well, dust the seed on the surface and place a piece of glass on the top. If it wants watering again before the young plants appear, stand the box or pan in some water and let it soak up; do not water from the top or the seed will be washed.

This branch met on 2nd August, when it was decided to compete in the District Bureau Competition at next Newcastle show. It was also agreed to be represented in the effort to arrange for a local co-operative movement.

Tregeagle, Chilcott's Grass, and Alphadale.

A meeting of this newly-formed branch (of which Mr. J. A. Haynes is the Hon. Secretary) was held on 7th July. After formal business had been transacted, a discussion took place on herd-testing. Mr. J. Buckley, in opening the subject, suggested that some means should be adopted of preventing the culls from tested-herds being placed on the market and bought

up by other farmers as guaranteed cows. Mr. Pryce said that while a dairyman might improve his herd to high yielding capacity, the introduction of a new bull into the herd would sometimes undo all that had been done, and reduce the herd to its previous level. Others took part in an interesting discussion.

Wallsend.

The monthly meeting was held on 18th July, when four offers to provide land for the erection of a hall for the branch were considered, and that of Mr. Lindsley accepted. It was decided to stage a display of produce at next Newcastle show in the competition for branches of the Bureau, for which a prize of £50 is offered.

Mr. Payne, of the Metropolitan Meat Industry Board, delivered a lecture at Cardiff to the amalgamated branches of Adamstown, Toronto, Warner's Bay, Cardiff, and Wallsend, on co-operation during the month, and the necessity of doing something to remedy the present deplorable marketing conditions was unanimously agreed upon. A committee was formed to draw up concrete proposals and submit to a later meeting.

The Forthcoming Fruit Crop.

A paper was read by Mr. P. Miller on this subject. To overcome gluts and allied contingencies, he urged that all branches of the Bureau in the district should organise immediately to find other avenues for the disposal of their products. In the present circumstances there was no incentive to plant more trees (although the public could, and would, consume up to six times as much fruit as was now grown), owing to the loss consequent on the system of distribution by middlemen.

Last season over £48,000 was lost to growers in peaches alone owing to this marketing system, and growers should take strong steps to combat this enormous loss.

The scheme now under consideration by the various branches contained suggestions, as follows :—

1. To conduct an associated-bureau store in Newcastle, employing their own graders, to secure to the public properly-graded fruit at an equitable price.
2. Unsold fruit to be made into fruit pulp or jam, the former for export and the latter for local consumption.
3. A factory to be established for the manufacture of lemon and orange squash.
4. Manufacture of candied peel.
5. One buyer in Sydney for the amalgamated branches of the Bureau.

To carry out this ambitious campaign it was necessary that at least 90 per cent. of growers should join the movement.

Warrah Creek.

A meeting was held on 14th July, when the site for a sheep dip was further discussed, the Pastures Protection Board having intimated willingness to grant a special lease of one acre for the purpose. The conditions were considered unsuitable, and members are seeking a freehold site.

It was agreed to apply to the Public Library for a box of books on agriculture.

Wellington.

On 15th July, Mr. W. H. Broadfoot, Fruit Inspector, conducted pruning demonstrations at the orchards of Mr. J. Edwards and Mr. M. McLeod, the attendances being good. Much interest was taken in the subject, and all appreciated Mr. Broadfoot's method of handling it.

Wentworthville.

A meeting was held on 6th July, when the monthly display of vegetables took place, some fine specimens being exhibited. The competition in several classes was keen.

A meeting of the Cumberland United Agricultural Bureau was held on 9th July, the following branches being represented:—Chatswood, Auburn, Wentworthville, and Blacktown. It was agreed that all branches in the county be invited to send one delegate for each fifty members to subsequent meetings.

A lantern lecture on insect pests was given by Mr. T. McCarthy, Assistant Entomologist, on 20th July. The value of good cultivation and the removal of all rubbish from and near the garden or orchard was indicated, and also the methods of control of sprays. The different phases of insect development from birth to maturity, and the time when most damage was done were both fully illustrated on the screen. After the enemy insects, the friendly insects were dealt with, and numerous questions were asked and answered before the meeting closed.

A fine collection of flowers was staged before the lecture in connection with the fortnightly competition.

Woonona.

The annual meeting was held on 12th July. The report and balance-sheet showed that good progress had been made in the year, the membership being 174, and the credit balance £66 2s. The show account was also £23 10s. in credit.

The report remarked that the branch was "out to educate, and if any man desired a farming life, then he could have many of his problems solved for him." Experiments in potato culture were being conducted on the local show grounds. The meetings had been well attended, co-operative buying is undertaken for members, and a school vegetable and flower show had been held during the year with great success.

The election of office-bearers resulted thus:—Chairman, Mr. E. Thomas; Vice-chairmen, Messrs. E. Cameron and N. H. Mann; Treasurer, Mr. G. Fowler; Librarian, Mr. E. Hope; Hon. Secretary, Mr. J. P. Fleming; Show Secretary, Mr. W. J. Polglase; Assistant, Mr. R. Hunter.

Yarramalong.

The monthly meeting was held on 15th July, when arrangements were made for a village exhibit at the next Wyong show.

Yarrandale.

A meeting was held on 26th July, when Mr. S. A. Hogg, Assistant Fruit Expert, gave a lecture and pruning demonstration at Mr. E. S. Twiggs' orchard.

Planting and Pruning.

The planting of trees was first dealt with. In digging the holes care must be taken to keep the top-soil and subsoil separate. Before planting all broken or damaged roots must be removed with a sharp knife. Should this be neglected the damaged portion died, and it was there that the white ant gained an entry, working its way up the roots to the stem of the tree. If at planting time care was taken to remove damaged roots and the orchard was kept well cultivated, white ants did little damage.

In planting, some of the subsoil with a little top-soil mixed with it was heaped, slightly cone-shaped, at the bottom of the hole, and on this the tree was set and the subsoil and top-soil were filled in, and the job finished up by pressing firmly around the tree with the foot Mr. Hogg favoured cutting back the newly-planted tree knee high, although it was not always done, some growers forming the trees from the strongest three branches.

In the pruning demonstration which followed the reasons for cutting out, shortening, or retaining were carefully explained. Asked why he had left the long leaders untouched on a certain tree that was otherwise apparently well pruned, Mr. Hogg said that experience had shown that the result of cutting back these leaders was a rush of sap, with three or four branches forming where there was one before. By leaving the leaders untouched the sap moved more slowly, and fruit was induced to form lower down on the tree. Once this condition was obtained the leaders could be cut back.

Yarrunga–Avoca.

The following is a report of Mr. E. Breakwell's lecture on 18th June :—

Lecture on Weeds and Grasses.

Mr. Breakwell remarked that, owing to unusually good seasons, weed growth had become a menace throughout the greater part of the State.

Unfortunately, in New South Wales, where generally speaking pastoral and farming areas were too large for intense cultivation, weeds had been allowed to obtain a stranglehold. Practically every farmer realised the immense damage weeds could do, but much required to be done. For example, in laying down pastures the following facts should be taken into account, but often were not :—(*a*) Weed growth was usually more rapid than grass growth; (*b*) if the germination of the weed seeds was not encouraged by a couple or more cultivations before the grasses were sown, they would germinate when the grasses were sown, and as often as not would smother the grasses or seriously affect their growth.

The farmer should ask himself the following questions :—(1) What are my worst weeds? (2) Can I grow any smothering crop or in any other way eliminate the weed growth before laying down a pasture? A few hints were offered in answer to such questions.

In the Avoca district the worst winter and spring weeds were Cape weed, thistles, docks, and sorrel. In order to suppress such weed growth, grasses and clovers should be sown on a well-worked and previously cultivated seed-bed, or when the weeds had already made their appearance in the autumn months and had been removed as much as possible by cultivation, winter grasses or clovers could be sown. Bad summer and autumn weeds that germinated in midsummer should be suppressed by sowing the summer crops well before or immediately after midsummer when the weeds had been cultivated out. If weed growth was very bad, smothering crops, such as oats, field peas, or vetches were extremely useful for winter crops, but they should be sown as early as possible in the autumn in order to ensure a good growth by the time the weeds appeared.

Useful summer crops that smothered weeds were certain varieties of sorghum and maize, and possibly strong-growing pasture crops like Bokhara clover or kikuyu grass.

Specimens of the various weeds common to the district were shown and described. Sorrel was one of the most difficult weeds to eradicate if it became well established on well-drained and fertile soil. Advantage should be taken of any dry spell to expose the roots to the sun. Couch grass should be cultivated as much as possible in the winter, exposing the roots to the frost. To plough couch grass down in the summer was only to encourage its growth.

Reference was made to the harmful nature of marsh mallow, as proved by recent investigations carried out by the Stock Branch. Specimens of St. John's wort and Paterson's curse were shown. Any new weed appearing in the district should be submitted to the Department for identification, and if harmful, steps should be taken to eradicate it as soon as possible. More good could be done by shire councils concentrating their attention on one or two of the worst weeds of the district, and seeing that they were eradicated, than by dissipating their money and energy over a large number, and eventually effecting nothing. Some of the bad weeds of this and other districts would never be eradicated until much closer settlement and more intense cultivation were the rule. A strong public spirit was necessary in keeping down weed growth. A careless farmer should be made to feel that he was a menace to the community in allowing his weed seeds to blow far and wide. The Department was doing its share.

The excellent work on the weeds of New South Wales, just issued by Mr. Maiden, should be in the hands of farmers. The Department was keeping a close check on all imported seed, and seeing that no noxious weeds were introduced.

Special grasses and clovers were shown and described as being suitable to the district.

AGRICULTURAL SOCIETIES' SHOWS.

SECRETARIES are invited to forward for insertion in this page dates of their forthcoming shows; these should reach the Editor, Department of Agriculture, Sydney, not later than the 21st of the month previous to issue. Alteration of dates should be notified at once.

1921.

Society.	Secretary.	Date.
Cowra P., A., and H. Association	E. P. Todhunter	Sept. 13, 14
Ganmain A. and P. Association	A. R. Lhuede	,, 13, 14
Cootamundra A., P., H., and I. Association	C. H. Inson	,, 14, 15
Northern A. Association (Singleton)	J. T. McMahon	,, 15, 16, 17
Canowindra P., A., and H. Association	John T. Rue	,, 20, 21
Holbrook P., A., and H. Society	J. S. Stewart	,, 20, 21
Temora P., A., H., and I. Association	A. D. Ness	,, 20, 21, 22
Burrowa P., A., and H. Association	W. Burns	,, 22, 23
Henty P. and A. Society	H. Wehrman	,, 27, 28
Junee P., A., and I. Association	T. C. Humphreys	,, 27, 28
Murrumburrah P., A., and I. Association	W. Worner	,, 27, 28
West Wyalong and District P., A., H., and I. Assoc.	T. A. Smith	,, 27, 28, 29
Deniliquin P. and A. Society	P. Fagan	,, 28
Condobolin P., A., H., and I. Association	C. H. Leiferman	Oct. 4, 5
Hay P. and A. Association	C. L. Lincombe	,, 5, 6
Narrandera P. and A. Association	W. Canton	,, 18, 19
Hillston P. and A. Society	J. E. Peerers	,, 20
Millthorpe A. and P. Association	C. J. E. Hawken	,, 26
Tweed River A. Society	T. M. Kennedy	Nov. 16, 17
Lismore A. and I. Society	H. Pritchard	,, 23, 24

1922.

St. Ives A. and H. Association	A. K. Bowden	Jan. 13, 14
Albion Park A. and H. Association	H. R. Hobart	,, 20, 21
Kiama A. Society	G. A. Somerville	,, 25, 26
Wollongong A., H., and I. Association	W. J. Cochrane	Feb. 2, 3, 4
Inverell P. and A. Association	A. L. Varley	,, 7, 8, 9
Shoalhaven A. and H. Association	H. Rauch	,, 8, 9
Central Cumberland A. and H. Assoc. (Castle Hill)	H. A. Best	,, 10, 11
Southern New England P. and A. Association (Uralla)	H. W. Vincent	,, 14, 15, 16
Nepean District A., H., and I. Society (Penrith)	C. H. Fulton	,, 16, 17, 18
Dapto A. and H. Society	J. T. Geeson	,, 17, 18
Guyra P., A., and H. Association	P. N. Stevenson	,, 21, 22
Moruya A. and P. Society	H. P. Jeffery	,, 22, 23
Newcastle A., H., and I. Association	E. J. Dann	,, 22 to 25
Robertson A. and H. Society	E. S. Martin	,, 24, 25
Tenterfield A. Society	E. W. Whereat	Feb. 28 Mch. 1, 2
Tumut A. and P. Association	T. E. Wilkinson	March 1, 2
Oberon A., P., and H. Association	C. S. Chudleigh	,, 2, 3
Berrima District A., H., and I. Society	W. Holt	,, 2, 3, 4
Blacktown and District A. Society	J. M. McMurtrie	,, 3, 4
Glen Innes P. and A. Society	Geo. A. Priest	,, 7, 8, 9
Kangaroo Valley A. and H. Association	L. W. Vance	,, 8, 9
Campbelltown A. Society	J. T. Deane	,, 10, 11
Mudgee A., P., H., and I. Association	S. H. Somerville	,, 14, 15, 16
Armidale and New England P., A., and H. Assocn.	A. H. McArthur	,, 14 to 17
Cobargo A., P., and H. Society	T. McKennelly	,, 15, 16
Barraba P., A., and H. Association	C. E. Williams	,, 15, 16, 17
Luddenham A. and H. Association	L. W. Eaton	,, 17, 18
Tamworth P. and A. Association	F. G. Callaghan	,, 21, 22, 23
Hunter River A. and H. Association (Maitland)	E. H. Fountain	,, 22 to 25
Camden A., H., and I. Society	C. C. Irving	,, 23, 24, 35
Upper Hunter P. and A. Association (Muswellbrook)	R. C. Sawkins	April 5, 6
Royal Agricultural Society of N.S.W.	H. M. Somer	,, 10 to 19
Clarence P. and A. Society (Grafton)	L. C. Lawson	May 3, 4, 5, 6

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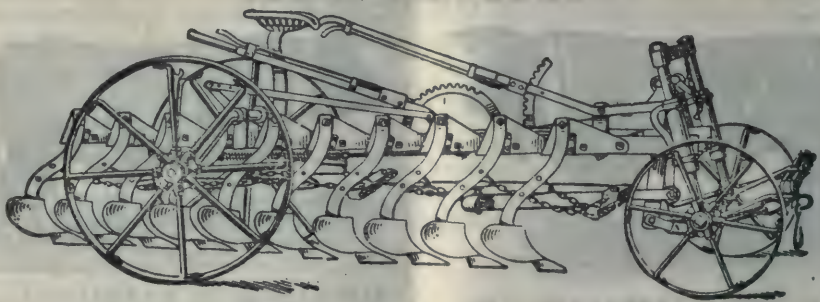

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				1921	
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2601	Berkshire Sow ...	Wodonga Pat ...	Herrison Queen IV	Feb. 6	11 11 0
2604	Berkshire Sow ...	Wodonga Pat ...	Gladesville Duchess III	Feb. 6	11 11 0
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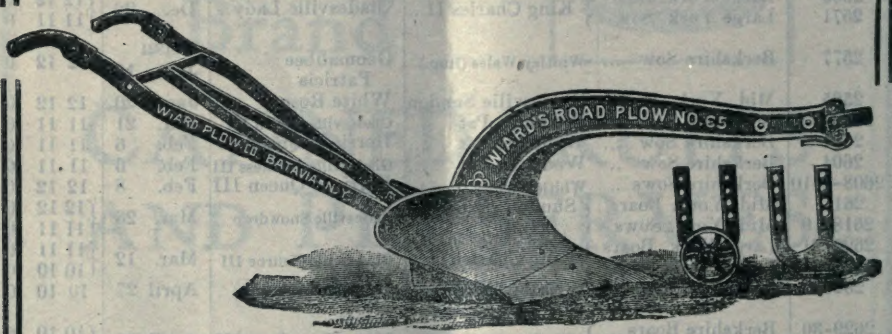

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All Steel Tank Sinkers' or Road Contractors' Plough

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This Plough (No. 68), has been built to meet the demands of Contractors, where great strength and capacity are necessary. It can be used with four or more horses, or steam power if required.

Price - - £26 5s.

Extra Steel Points - - - 60s.

Write for a copy of our Illustrated Price List of Agricultural and Farm Implements. IT WILL BE POSTED FREE.

ANTHONY HORDERN & SONS, LIMITED,

BRICKFIELD HILL, SYDNEY.

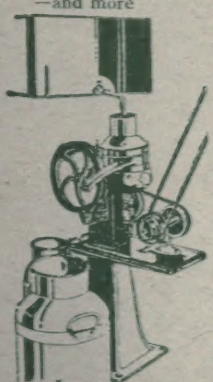
BALTIC

Choicest Cream—Unvarying tests—Longer Wear.

H.F (for 1 good cow or 2 average cows) skims 2 gallons in 15 minutes. Improves the value of an average cow by £6 a year—of a good cow by at least £9 a year. Having special discs with patent cream guides (fitted only on Baltics). H.F is a real "cream" separator. Only one gear, easy turning. Lasts 10 years—and more

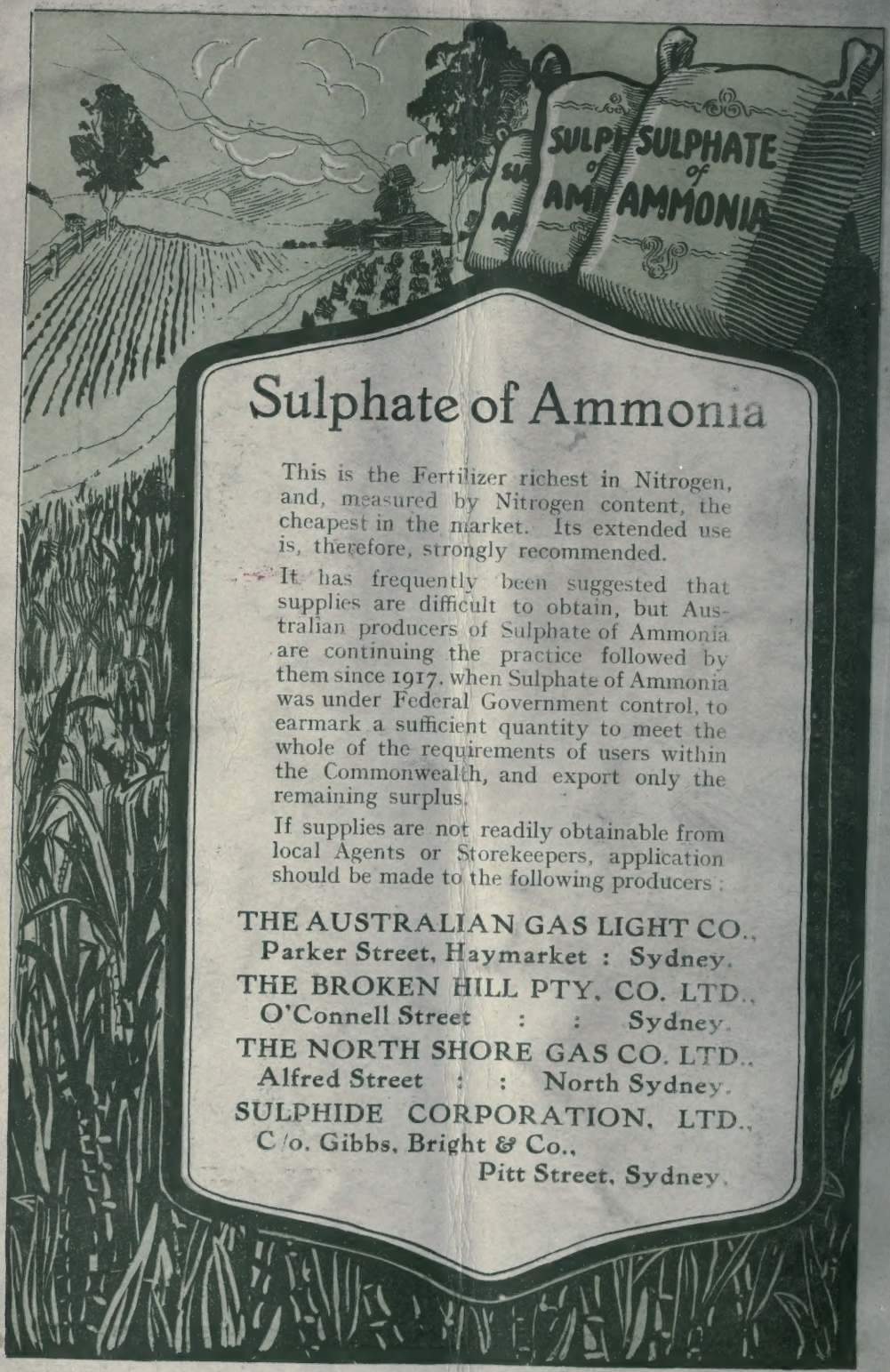
M.O skims 3 gallons in 12 minutes. Gives more cream than you'd get from 4 gallons in the ordinary way. K Model, like M.O has automatic crank clutch (no spring or pin to renew) and ingeniously constructed gear in a very compact frame. K 1 skims 5 gallons in 14 minutes. K 2 skims 8 gallons in 16 minutes. Suit small farmers in price and size.

Model D (specially for the dairyman and dairy farmer) is made in 7 sizes with or without stand, power gear, etc. There are eight outstanding features apart from the skimming discs with patent cream guides (fitted only on Baltic Separators) which have everywhere earned the praise of Dairymen, Factory Managers, and Dairy Experts.



Household, Farm, Dairy and Power separators, 1½ h.p. separator engines for cash or on terms. Seamless cans, buckets, strainers churns, 2 to 10 h.p. petrol and kerosene engines, separator oil, cream and milk coolers, vats, etc., Simplex Milking Machines

BALTIC
Separator Co. Ltd.
72 Wentworth Av. Sydney
Woodlark St., Lismore
57 Prince St., Grafton



Sulphate of Ammonia

This is the Fertilizer richest in Nitrogen, and, measured by Nitrogen content, the cheapest in the market. Its extended use is, therefore, strongly recommended.

It has frequently been suggested that supplies are difficult to obtain, but Australian producers of Sulphate of Ammonia are continuing the practice followed by them since 1917, when Sulphate of Ammonia was under Federal Government control, to earmark a sufficient quantity to meet the whole of the requirements of users within the Commonwealth, and export only the remaining surplus.

If supplies are not readily obtainable from local Agents or Storekeepers, application should be made to the following producers:

THE AUSTRALIAN GAS LIGHT CO.,
Parker Street, Haymarket : Sydney.

THE BROKEN HILL PTY. CO. LTD.,
O'Connell Street : : Sydney.

THE NORTH SHORE GAS CO. LTD.,
Alfred Street : : North Sydney.

SULPHIDE CORPORATION, LTD.,
C/o. Gibbs, Bright & Co.,
Pitt Street, Sydney.